Second Edition

Medical Language

ACCELERATED

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Mc Graw Hill

MEDICAL LANGUAGE ACCELERATED, SECOND EDITION

This book is printed on acid-free paper.

1 2 3 4 5 6 7 8 9 LCR 21 20

ISBN 978-1-260-01773-1 (bound edition)
MHID 1-260-01773-7 (bound edition)
ISBN 978-1-260-47161-8 (loose-leaf edition)
MHID 1-260-47161-6 (loose-leaf edition)

Executive Portfolio Manager: *William Lawrensen*
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Cover Image: *Frank Rohde*
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Library of Congress Cataloging-in-Publication Data

Names: Jones, Steven L., 1975- , author. | Cavanagh, Andrew, author.
Title: Medical language accelerated / Steven L. Jones, Andrew Cavanagh.
Description: Second edition. | New York, NY : McGraw-Hill Education, 2020.
| Includes index. | Audience: Ages 18
Identifiers: LCCN 2019035881 | ISBN 9781260017731 (bound edition : alk. paper)
| ISBN 9781260471618 (loose-leaf edition : alk. paper)
Subjects: MESH: Terminology as Topic | Problems and Exercises
Classification: LCC R123 | NLM W 18.2 | DDC 610.1/4—dc23
LC record available at https://lccn.loc.gov/2019035881

mheducation.com/highered

dedication

To our wives:

Tamber Jones

and

Ashley Cavanagh.

Your devotion, support, encouragement,

and assistance made this book possible.

brief contents

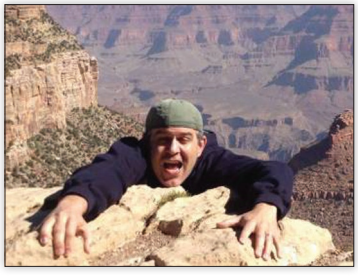
about the authors

Steven L. Jones, PhD

Steve holds a BA in Greek and Latin from Baylor University, an MA in Greek, Latin, and Classical Studies from Bryn Mawr College, and a PhD in Classics from the University of Texas at Austin. Steve currently teaches Medical Terminology at Rice University in Houston, TX. He has held previous faculty appointments at Trinity University, the University of Texas at Austin, Baylor University, and Houston Baptist University. In addition to Medical Terminology, he teaches courses on Latin, Greek, Mythology, Classical Civilization, and Early Christianity.

When not breaking down medical words, Steve enjoys taking road trips with his wife and six children, watching baseball, eating tacos, drinking ice-cold Dr Pepper, and showing off his parallel-parking skills.





(top-left): Steve L. Jones; (top-right and bottom): Tamber Jones

Andrew Cavanagh, MD

Andy holds a BS in genetics from Texas A&M University and an MD from Texas A&M College of Medicine. After completing his residency at Palmetto Health Children's Hospital, he moved to the Austin area. He is currently owner and Chief Medical Officer of Chisholm Trail Pediatrics in Georgetown, TX. In addition to being board certified in pediatrics, Andy has served as the pediatric specialty chief for Dell Children's Medical Center and on the board of Dell Children's Medical Center Executive Committee. He is currently clinical assistant professor of pediatrics at the Texas A&M College of Medicine.

When not comforting sick children at work or wrestling with his own three kids at home, Andy enjoys powerlifting, hiking, and making his wife laugh.



(top-left): Shane Littleton; (top-right): Ashley Cavanagh; (bottom): Andy Cavanagh

preface

Courtesy Steve L. Jones

A Note from the Authors on Why They Wrote This Book

This book has its beginning in the friendship that Andy and Steve developed while they both lived in Austin. Andy was beginning his pediatric practice. Steve was completing his doctorate at UT. They had kids the same age and attended the same church. One evening after dinner, while sitting on Andy's back porch, Steve mentioned a new course he had been assigned to teach: Medical Terminology. What started as Steve complaining ended in a game where Andy tried to stump Steve by asking him what various medical words meant. Andy was amazed at how much Steve could figure out just by breaking down words. Steve was astonished to realize that most people—from medical assistants to medical doctors—weren't taught medical language this way. Through this conversation and others like it, Steve and Andy realized three things:

1. Understanding how to break down medical language is an essential skill in the medical field.
2. Having a basic knowledge of the Greek and Latin roots made medical language radically transparent.
3. The current market is lacking a textbook that teaches medical language this way.

This book is their attempt to meet those needs.

New to the Second Edition

1. Body system chapters have word tables focusing on radiology, oncology, and pharmacology.
2. Overview of burns (Chapter 3)
3. Expanded coverage of sexual transmitted infections (Chapter 12)

How to Use the Book

The Approach

Medical Language Accelerated approaches medical terminology not as words to be memorized but as a language to be learned. If you treat medical terminology as a language and learn how to read terms like sentences, you will be able to communicate clearly as a health care professional and will be a full participant in the culture of medicine. Memorizing definitions is equal to a traveler memorizing a few phrases in another language to help during a brief vacation: It will help a traveler survive for a few days. But if one is going to live in another culture for an extended period of time, learning to speak and understand the language becomes essential.

Medical Language Accelerated teaches students to **break down words into their composite word parts.** Instead of a dictionary full of terms that need to be memorized, a student equipped with groups of roots, prefixes, and suffixes can easily understand a vast amount of medical terminology.

Medical Language Accelerated bridges the gap between the two somewhat disparate fields that make up medical terminology—medicine and second-language acquisition—by providing assistance in language skills to equip health care professionals with the ability to learn and apply a useful skill and not lists of words. It will also equip language professionals with real-world examples that make their knowledge of languages applicable to working in the world of health care.

The process is best illustrated by considering the following word: pneumonoultramicroscopicsilicovolcanoconiosis. Memorizing the definition to words like this would seem like an intimidating task. If you break it into its composite parts, you get:

pneumono	/ ultra	/ micro	/ scopic	/ silico
lung	*/ extremely*	*/ small*	*/ looking*	*/ sand*

/ volcano	/ coni	/ osis
/ volcanic	*/ dust*	*/ condition*

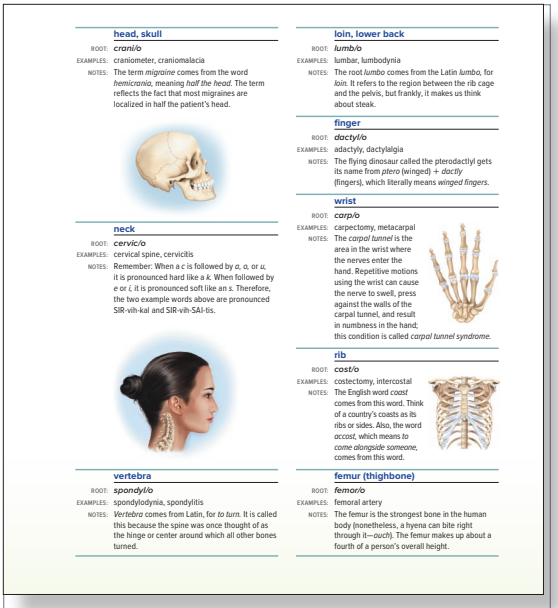
Through knowledge of roots and word formation, the meaning becomes transparent: "A condition of the lungs caused by extremely small bits of volcanic sand." Instead of having to memorize a long list of even longer words, a student equipped with the knowledge of roots and how to break apart words can tackle—and not be intimidated by—the most complicated sounding medical terms.

The approach to medical terminology presented in this book was originally developed for *Acquiring Medical Language*. We adapted the methodology for use in an accelerated format hence the new title: *Medical Terminology Accelerated*. The approach is unchanged. The principle difference between the two books deals with the coverage of terms included in each text. *Medical Terminology Accelerated* emphasizes the terms that readily breakdown according to the principles taught in this book. Every word reinforces the roots associated with each body system and reiterates prefixes and suffixes. The result is a book that allows students to adopt an accelerated approach to learning medical terminology.

Organization and Key Features

Medical Language Accelerated begins with two introductory chapters: Chapter 1, Introduction to Medical Language; and Chapter 2, Introduction to Health Records. Chapters 3 through 13 are dedicated to individual systems of the body and review common roots, words, and abbreviations for each system.

1. **"Card-Based" Approach:** Each chapter opens with a section on word parts for that particular body system. Students are introduced to roots via pages with illustrations of body systems surrounded by "cards" containing the names of body parts, specific word roots related to those parts, a few examples containing the roots, as well as some interesting facts to make the information more memorable. The student is exposed to all relevant information (the root, its meaning, its use) and sees how each root relates to the other roots in the context of the body system, without ever needing to turn the page.



2. **SOAP Note Organization:** After the student is introduced to the important roots for the chapter using "cards," the medical terms relevant to the body system are presented using the SOAP note as an organizational framework. *SOAP* is an acronym used by many health care professionals to help organize the diagnostic process (SOAP is explained more fully in Chapter 2). The terms will be divided under the following headings:

Subjective: Patient History, Problems, Complaints

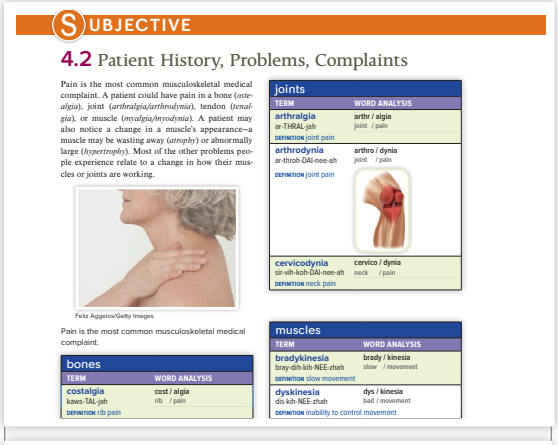
Objective: Observation and Discovery

Assessment: Diagnosis and Pathology

Plan: Treatments and Therapies

The SOAP note method is a fundamental way of thinking about the language of health care. By building this approach into the framework of the pedagogy, *Medical Language Accelerated* prepares future health care professionals to speak the language of medicine.

3. **Realistic Medical Histories:** *Medical Language Accelerated* incorporates realistic medical histories in reviewing each chapter's material to expose students to what they can expect in the real world. The student is given an example of an electronic health care record and is asked a series of questions. Though it is not expected that

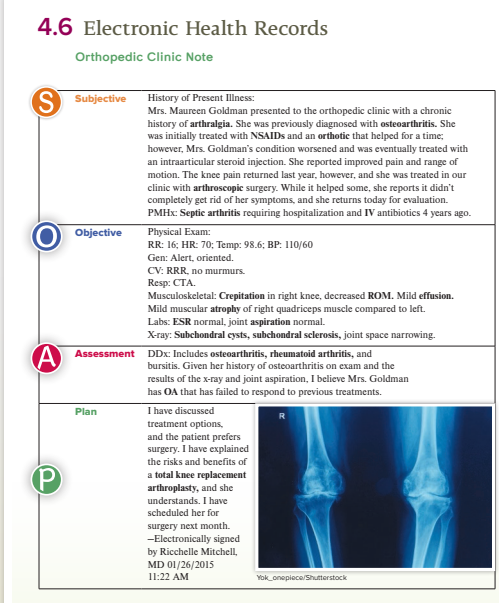


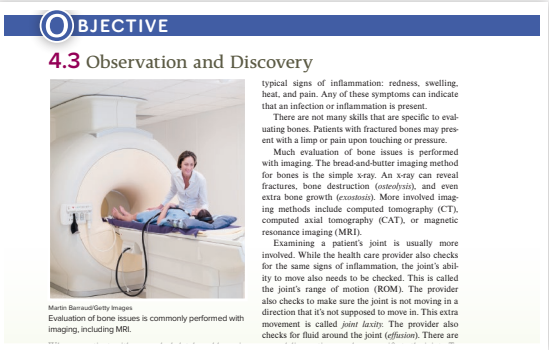
to move. This is a very common reason for a joint replacement surgery.

Other causes of arthritis include infection (*septic arthritis*) and a disease of joint inflammation (*rheumatoid arthritis*). Other parts of the joint area that can cause problems are the bursa (*bursitis*) and tendon (*tendonitis*). These are not usually caused by an injury; instead, they are a result of normal wear and tear over time.

Unusual inflammatory conditions also affect the muscles. Muscles can become inflamed (*myositis*). Sometimes this can involve the skin as well (*dermatomyositis*). General problems with all the muscles are called *myopathies*. *Myasthenia gravis* and *muscular dystrophy* are two of the most common types of myopathy.

everything in the record will be intelligible to them, the goal is to expose students to the context in which they will see medical terminology. This process will encourage students not to feel





typical signs of inflammation: redness, swelling, heat, and pain. Any of these symptoms can indicate that an infection or inflammation is present.

There are not many skills that are specific to evaluating bones. Patients with fractured bones may present with a limp or pain upon touching or pressure.

Much evaluation of bone issues is performed with imaging. The bread-and-butter imaging method for bones is the simple x-ray. An x-ray can reveal fractures, bone destruction (*osteolysis*), and even extra bone growth (*exostosis*). More involved imaging methods include computed tomography (CT), computed axial tomography (CAT), or magnetic resonance imaging (MRI).

Examining a patient's joint is usually more involved. While the health care provider also checks for the same signs of inflammation, the joint's ability to move also needs to be checked. This is called the joint's range of motion (ROM). The provider also checks to make sure the joint is not moving in a direction that it's not supposed to move in. This extra movement is called *joint laxity*. The provider also checks for fluid around the joint (*effusion*). There are

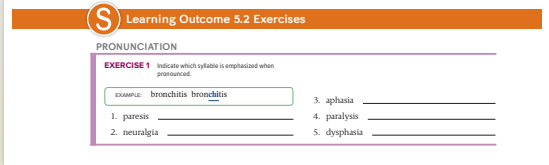
before new bone (*graft*) or artificial hardware (*prosthesis*) can be installed. This reconstruction of bone procedure is called *osteoplasty*.

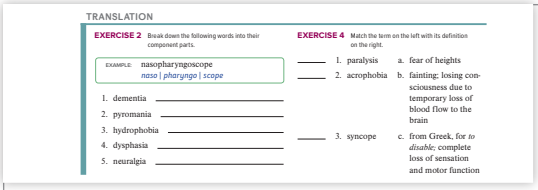
Similar procedures exist for joints. Sometimes, removal of a diseased joint (*arthrectomy*) is necessary, followed by a reconstruction of the joint with a prosthesis (*arthroplasty*). These are common treatments for diseased knees and hips. A less aggressive surgery for fixing diseased joints, *chondroplasty*, involves fixing the bad cartilage of a joint. It is very common in athletes and older patients with chronic osteoarthritis.

Not all orthopedic surgery involves complete reconstruction of a bone or joint. Sometimes something that has snapped must be repaired, as in a tendon repair (*tenorrhaphy*) or a muscle repair (*myorrhaphy*). Other times, new attachments must be made. This can involve attaching leftover muscle to bone (*myodesis*) after an amputation or fixing two bones surrounding a joint (*arthrodesis*). While the latter procedure results in immobility of the joint, it may be necessary to relieve pain.

intimidated by the prospect of seeing words they are unfamiliar with. We have seen this help students glean information from the chart by using the skills they are acquiring in translating medical terminology.

4. **Practice Exercises:** Each section ends with an abundance of practice exercises, giving students the opportunity to practice and apply what they have just learned. Exercises are grouped into categories: Pronunciation, Translation, and Generation. This progression and repetition allows students to gradually build their skills—and their confidence—as they learn to apply their medical language skills. Abundant Chapter Review exercises, as well as additional labeling and audio exercises, are available through McGraw-Hill Connect®.





TRANSLATION

EXERCISE 2 Break down the following words into their component parts.

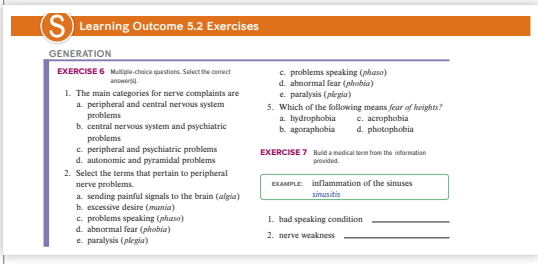
EXAMPLE: nasopharyngoscope
naso | pharyngo | scope

1. dementia _____
2. pyromania _____
3. hydrophobia _____
4. dysphasia _____
5. neuralgia _____

EXERCISE 4 Match the term on the left with its definition on the right.

_____ 1. paralysis
_____ 2. acrophobia
_____ 3. syncope

a. fear of heights
b. fainting; losing consciousness due to temporary loss of blood flow to the brain
c. from Greek, for *to disable;* complete loss of sensation and motor function



Learning Outcome 5.2 Exercises

GENERATION

EXERCISE 6 Multiple-choice questions. Select the correct answer(s).

1. The main categories for nerve complaints are
   a. peripheral and central nervous system problems
   b. central nervous system and psychiatric problems
   c. peripheral and psychiatric problems
   d. autonomic and pyramidal problems
2. Select the terms that pertain to peripheral nerve problems.
   a. sending painful signals to the brain (*algia*)
   b. excessive desire (*mania*)
   c. problems speaking (*phaso*)
   d. abnormal fear (*phobia*)
   e. paralysis (*plegia*)
5. Which of the following means *fear of heights?*
   a. hydrophobia
   b. agoraphobia
   c. acrophobia
   d. photophobia

EXERCISE 7 Build a medical term from the information provided.

EXAMPLE: inflammation of the sinuses
sinusitis

1. bad speaking condition _____
2. nerve weakness _____

To the Instructor

To teach medical terminology as a language, we adopt techniques employed in second-language acquisition. This helps students not just learn the roots, but also adopt a way of thinking and speaking that enables them to communicate using the language of medicine. Cognitive and educational psychologists divide language instruction techniques into two primary categories: contextualized ("real-world" exercises) and decontextualized (academic/grammar exercises).

Using this framework, some of the techniques employed in *Medical Language Accelerated* include:

1. **Contextualized Language Techniques ("real-world" exercises)**
   a. *Link new language to old language.* Pointing out instances of medical terms or roots in everyday use enables the students to connect new information they are studying with information they already possess.
   b. *Use new language in context.* Using the "card" system to introduce the root words enables students to understand word parts in the context of larger body systems and in relation to other word parts. Using realistic medical charts enables students to see the terms they use not as lists but as parts of a system of communication.
2. **Decontextualized Language Techniques (academic/grammar exercises)**
   a. *Use repetition.* The students are exposed to roots, prefixes, and suffixes multiple times and in multiple ways. Roots are changed by the addition of prefixes or suffixes. Familiar prefixes and suffixes are applied to new roots. This way, the word components are continuously reinforced.
   b. *Use translation.* Students are asked to provide literal definitions of medical terms, which provides practice in breaking down words into their component parts and determining their meaning.
   c. *Use generation.* Students are asked to produce medical terms based on the literal definition provided. Though this is only an academic exercise, such practice reinforces material learned by reversing the cognitive process of translation.

As you use this text, here are some things to keep in mind:

1. **Breakdown Is the Key**—the goals of this approach to medical terminology are to help students internalize the word parts (roots, prefixes, suffixes) and to reinforce the concept that medical terms are not to be memorized but to be translated.
2. **Words Are Practice**—the words in each chapter are a chance to practice breaking down terms into their component parts, identifying the roots, and learning to define the terms using this translation method. Because of that, each chapter contains four classes of words.
   a. *Essential words that break down*—Each chapter contains words that are essential for students to know AND that break down easily using this method. The core of each chapter is words like this. The goal is to show students that the vast majority of medical terms are translatable using the method taught by this book.

b. *Non-essential words that break down*—Each chapter also contains words that are not necessarily essential for students to know or common in the medical field, but break down clearly and are easily translatable using the method taught by this book. We include them as chances to practice the concept of translating medical terms and to show how easy the method is to apply.

c. *Essential words that don't benefit from breakdown*—There are terms that can be broken down but the breakdown doesn't help you understand what the word means. This can happen for a variety of reasons, such as the term describes a symptom rather than the disease, reflects an outdated way of understanding the disease, is an ancient term than just means what it means, or is a very recent and technical term and so there are no other words to compare it to. In these cases, even though the method taught by this book may not be ideal in helping to learn these terms, we still provide breakdowns and other notes to help make the information stick in the student's memory.

d. *Essential words that don't break down*—We admit it. This method doesn't work for every word. Some words essential for students to know do not break into word components. They must be memorized. We include those words because they are crucial words for medical professionals to know. Our hope is that the inclusion of these words in the real-life health records and other contextualized learning environments in this book will support students in internalizing these essential terms.

3. **The Use of "Roots" in Place of "Combining Forms"**—We understand that it's common practice in medical terminology courses to teach students the difference between roots and combining forms. This is not a part of our approach, and you will see that in this book, the term *combining form* is absent and the term *root* has been used in its place. Here are the reasons why we decided to do this.

a. In the real world of medical language, the classifications of "root" and "combining form" are nonexistent. The reason for this is that they mean virtually the same exact thing to healthcare professions in practice. The part of the term that is defined as a combining form can be used interchangeably with root without confusion. Also, word "roots" are more commonly used outside the world of medical terminology instruction. For our approach, using "root" instead of "combining form" prepares students better by presenting terminology as it is commonly used in broader health professions. If you were to hit "Ctrl+F" to find and replace all instances of the word *root* with *combining form* in our text, nothing . . . NOTHING . . . is changed, lost, or unclear to the student.

b. The importance of combining vowels and forms deals with how they impact pronunciation of terms, not definitions. Some instructors will argue, but there is only a minimal difference in meaning, if any. We feel that great confusion is created by insisting on and highlighting the difference as once a student completes the med term class, being able to identify a component part as root or combining form is no longer practical. We do recognize this difference between a root and a combining form in Chapter 1 as follows: "When we say that a word part such as *cardi/o* is a root, we aren't speaking precisely. Technically, *cardi/o* is called a combing form. A combining form is a combination of a root with a combining vowel."

c. The word *root* is shorter than *combining form* by more than a third of letters (4 letters vs. 13 letters). It may sound silly, but to us the purpose of teaching medical terminology is to streamline communication. The use of *combining*

form is an unnecessary complication that doesn't bring value to the learner but may add potential confusion.

4. **Pronunciations are Challenging for Students.**
   a. *We all speak differently*—English is an incredibly diverse language with numerous dialects and accents from all over the globe. One consequence of this is that we all speak in slightly different ways. Some of us break words into syllables at slightly different places or pronounce certain syllables differently. With that in mind, the pronunciation guides given in the book should be viewed as guidelines or directions, not universal laws.
   b. *Phonetic* versus *non-phonetic syllable breakdowns*—In the exercises, we frequently ask students to break words into syllables. When that happens, students might ask for guidance in doing this. Though we didn't explicitly break words into syllables, the syllable breakdown can be determined by looking at the Phonetic Pronunciation guide provided for each word. Encourage students to use critical thinking skills to align letters in the term with syllables in the guides.
   c. *For example*—Consider the word salpingoscope. The phonetic pronunciation guide describes it as: sal-PING-goh-skohp. But how does that translate to syllable breakdown? Why is the "g" is used in two syllables? Shouldn't it be either "sal-pin-go-scope" or "sal-ping-o-scope"? Well, a case can be made for either of those two choices. The truth of the matter is that we all say the word slightly different. The word is most accurately pronounced by leaving a little bit of the "g" in both syllables. Admit it, when you drop the G from PIN, you end up saying PIN a little bit differently. We say this not to complicate things but to encourage you to be flexible. We acknowledge that our pronunciation guides aren't etched in stone . . . more like etched in Silly Putty.

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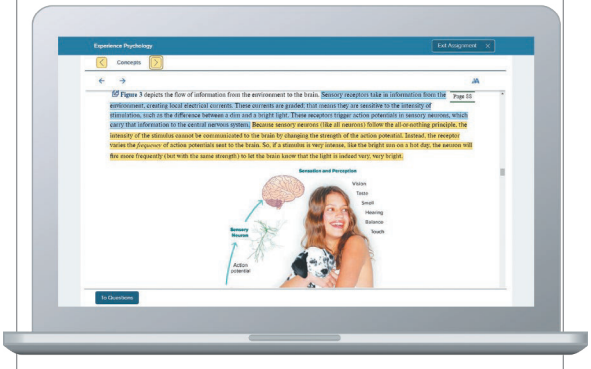

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A Note from the Authors: To the Student

The purpose of this program is to equip you with foundational skills as you prepare for a career in health and medicine. As you enter the culture of medicine, you will need to speak the language to understand what is going on around you and to be understood by your colleagues and patients. Though learning medical language can seem a daunting task, it is our hope that this program reduces some of the anxiety that accompanies learning any new language. We hope this program shows you how clear the language of medicine is to understand as you begin to master some key concepts. As you get started, here are some helpful words of advice:

1. *Don't panic.* Immersing yourself in any new language can be intimidating. On occasion, you will probably feel overwhelmed, like you are being bombarded with information you don't understand and don't know how to make sense of. Start by trying not to panic. Things always look intimidating when you begin. The water is always coldest when you first jump in. You will get used to it. Be patient. Follow the steps.
2. *Eat the elephant.* Do you know how to eat an elephant? One bite at a time. One of the easiest ways to keep from panicking is to break down things into easily digestible chunks. Don't focus on the total amount of information you have to learn; rather, focus on the bite in front of you.
3. *Practice makes permanent.* The easiest way to master medical language is to practice. You readily absorb what you are repeatedly exposed to. So practice. Repeat. Do it again. The more you do it, the more you will be able to do it, and the more you will enjoy doing it.
4. *Build bridges.* Medical language is everywhere: on TV shows, in the news, in your own life. Look for it. See if you can figure out the meaning of words you hear. Build connections between what you are learning and the world you live in. See how often you encounter these words. The more you practice it, the more it will be burned into your memory.

Acknowledgments

Suggestions have been received from faculty and students throughout the country. This is vital feedback that is relied on for product development. Each person who has offered comments and suggestions has our thanks. The efforts of many people are needed to develop and improve a product. Among these people are the reviewers and consultants who point out areas of concern, cite areas of strength, and make recommendations for change. In this regard, the following instructors provided feedback that was enormously helpful in preparing the book and related products.

Reviewers

We'd like to thank the many reviewers and SMEs who have helped us with the first, and now this second edition.

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Special thanks to the instructors who helped with the development of Connect, LearnSmart, and SmartBook.

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Acknowledgments from the Authors

We would like to thank the following individuals who helped develop, critique, and shape our textbook, our digital materials, and our other ancillaries. We are grateful for the efforts of our team at McGraw-Hill Education who made all of this come together. We would especially like to thank Michelle Vogler, Director; William Lawrensen, Executive Portfolio Manager; Christine "Chipper" Scheid, Senior Product Developer; Roxan Kinsey, Executive Marketing Manager; Ann Courtney, Senior Content Project Manager; Brent dela Cruz, Lead Content Project Manager; David Hash, Lead Designer; and Lorraine Buczek, Content Licensing Specialist.

Acknowledgments from Steven L. Jones

Above all, I am grateful for the love and support of my family: my wife, Tamber, and our six children, I am also thankful for the support of my colleagues at the universities where I worked while completing this project. At Rice University: Nicholas K. Iammarino, Chair of the Department of Kinesiology; and Jennifer Zinn-Winkler, the program administrator. At Houston Baptist University: President Robert Sloan,

Christopher Hammons, Micah Mattix, Timothy A. Brookins, Evan J. Getz, Gary Hartenburg, Randy Hatchett, and Jerry Walls. In addition, I am deeply indebted to my friends for their encouragement: Daniel Benton, Michael Bordelon, Michael Czapla, Nathan Cook, Russell Thompson, Dan Euhus, and Brad Flurry.

Acknowledgments from Andrew Cavanagh

I am most thankful for the loving support of my wife, Ashley, and children, Katie, Nathaniel, and Jack. I owe a great debt of gratitude to my mother, Katherine Cavanagh, who worked tirelessly to provide for me as I grew up and passed on to me her admirable work ethic. I would also like to thank John Blevins for fostering my love of medicine and pediatrics and for being a great role model. I would like to thank Caughman Taylor and the entire residency training program at Palmetto Health Richland, University of South Carolina, for their amazing teaching and dedication to the lives of the residents. I am grateful for Chisholm Trail Pediatrics. It is a joy to practice medicine in such a positive environment.

Introduction to Medical Language

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Introduction

You've probably had conversations with people who like to use big words. Maybe you've responded with a blank expression and a sarcastic phrase—something like, "Say it in English, please!" This happens all the time in health care practices.

When a patient comes in for treatment, he or she is often bombarded with unfamiliar words. The patient leaves bewildered, wondering what the health care professional just said. Sometimes patients do get up the courage to ask what it all means, and health care professionals explain in simpler terms. And patients wonder, "Well, why couldn't you have just said that in the first place? Why did you have to use all those big words?"

Learning Outcomes

Upon completion of this chapter, you will be able to:

1.1 Summarize the purpose of **medical language.**

1.2 Summarize the origins of **medical language.**

1.3 Summarize the principles of **medical language.**

1.4 Summarize how to pronounce terms associated with **medical language.**

1.5 Identify the parts used to build **medical language.**

1.6 Summarize how to put together **medical terms.**

1.7 Describe how **medical terms** are translated.

1.1 The Purpose of Medical Language

Why Is Medical Language Necessary?

"Why did you have to use all those big words?" is a good question. Why is medical language necessary? Following are a few reasons why medical language is both necessary and useful.

First, medical language allows health care professionals to be **clear.** Ours is a multicultural society. Many languages are spoken, each with their own words for illnesses and body parts. By using medical language, health care professionals are able to communicate and understand one another clearly, no matter what their first language is.

Second, medical language allows health care professionals to communicate **quickly.** Think about how this works in English. Instead of saying "a tall thing in the yard with green leaves," we just use the word "*tree.*" Instead of saying "a meal made up of a few slices of meat and cheese, topped with lettuce, mustard, and mayonnaise, and placed between two slices of bread," we just say "*sandwich*." Instead of having to use valuable time describing the symptoms of a disease or the findings of an examination, a health care professional uses medical language in order to be clear and easily understandable to other health care professionals.

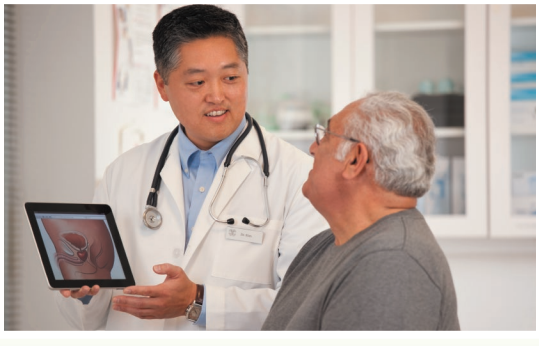
Third, medical language allows health care professionals to **comfort** patients. This reason might seem kind of odd, but it is true. When patients first enter a health care facility, they often don't feel well and are a little confused and worried about what is going on. Using medical language reassures patients that the health care professionals know what is going on and are in control. Sometimes a patient can be calmed and reassured that everything is OK by a health care professional repeating the same symptoms the patient reported—in medical language.

For example, one of us once saw a doctor about a rapid heart rate. The doctor was very reassuring—it was just "tachycardia." The doctor, however, didn't know he was talking to someone who was familiar with medical language. *Tachycardia* breaks down to *tachy* (fast, as in a car's *tachometer* reports the engine's revolutions per minute) + *card* (heart) + *ia* (condition). It literally means *fast heart condition.* The doctor was just repeating what he had heard.

Here's another example. Once, a young boy was sick and his doctors performed a series of tests to find out what was wrong. After receiving the test reports, the boy's parents were reassured. The doctors had diagnosed their child with an "idiopathic blood disorder." The diagnosis was enough for them.

Because the doctors had attached a fancy medical term to their son's condition, the parents figured the doctors knew what was wrong and how to treat it. In truth, the doctors hadn't told them anything. *Idiopathic* breaks down to *idio* (private or alone) + *pathic* (disease or suffering). It literally means *suffering alone.* The boy's condition was something the doctors had never seen before.

Medical language enables health care professionals to communicate quickly and easily no matter what their specific specialty or native language.
Jupiterimages/Getty Images



Medical language is able to reassure patients that health care professionals know what is going on and are in control.
Ariel Skelley/Blend Images LLC

Learning Outcome 1.1 Exercises

Additional exercises available in connect

EXERCISE 1 Multiple-choice questions. Select the correct answer.

1. Which of the following is NOT a reason why medical language is necessary and useful?
   a. Medical language allows health care professionals to be clear.
   b. Medical language allows health care professionals to comfort patients.
   c. Medical language allows health care professionals to communicate quickly.
   d. Medical language allows health care professionals to intimidate their patients.
2. Medical language allows health care professionals to be clear because
   a. few people really understand medical terminology, so at least everyone is speaking the same way
   b. health care professionals are in control of the situation and don't want to scare patients with a language that they could understand
   c. we live in a multicultural society with a variety of languages, and medical language is a way of speaking the same way about the same thing despite your native language
   d. none of these
3. Medical language allows health care professionals to communicate quickly because
   a. it is a quick way to speak to other health care professionals without taking the time to describe symptoms or examine findings
   b. the patients are usually baffled by the terminology and do not ask additional questions
   c. words with many syllables always communicate more information than words with few syllables
   d. none of these
4. Medical language allows health care professionals to comfort patients because
   a. it communicates a sense that the health care professionals are in control of the situation
   b. it lets the patients know that the health care professionals are not caught off guard by the symptoms at hand
   c. it lets the patients know that the health care professionals know what is going on
   d. all of these

1.2 The Origins of Medical Language

Where Does It Come From?

Medical language is made up primarily (but not exclusively) of words taken from two ancient languages: Greek and Latin. Other words creep in from other sources, but Greek and Latin serve as the foundation of medical language.

Some of these other sources include:

Eponyms. The word *eponym* is derived from the Greek words *epi* (upon) + *onyma* (name). It literally means *to put your name on something.* Thus, an eponym is a word formed by including the name of the person who discovered or invented whatever is being described. Sometimes, in the case of diseases, an eponym is named in honor of the disease's first or most noteworthy diagnosed victim.

This reminds us of a great old joke.

A doctor says to a patient, "I have good news and bad news. Which do you want first?"

The patient responds, "The good news."

The doctor replies, "Well, you are about to have a disease named after you."

One famous eponym is Lou Gehrig's disease. The neurological disease was named after the famous New York Yankees first baseman who suffered from the disease. The disease's scientific name is *amyotrophic lateral sclerosis.*

Acronyms. The word *acronym* is derived from the Greek words *acro* (high, end) + *onyma* (name). It literally means *to make a name with the ends.* Thus, an acronym is a word made up of the first letters of each of the words that make up a phrase. One example is the diagnostic imaging process called ***m****agnetic* ***r****esonance* ***i****maging,* or MRI. Remember that acronyms are just shorthand—you still need to know what the words mean.

Modern languages. Frequently, words from modern languages creep into the vocabulary of health care professionals. These words tend to come from whatever language happens to be most commonly spoken by the majority of health care professionals. In centuries past, German or French were the most common languages, so they were the foundation of many medical terms. Currently, the fastest-growing and most-used language in the world is English. Thus, English has also contributed a fair number of medical terms.

Why Greek and Latin?

Although the three previously mentioned sources have contributed a significant number of words to the language of medicine, Greek and Latin make up its foundation and backbone. Even *eponym* and *acronym* were derived from Greek! But why are Greek and Latin so prevalent? There are at least three reasons why.

Reason 1: The foundations of Western medicine were in ancient Greece and Rome. The first people to systematically study the human body and develop theories about health and disease were the ancient Greeks. The Hippocratic Oath, the foundation of modern medical ethical codes, is named after and was possibly composed by a man named Hippocrates who lived in Greece from about 460 BC to about 370 BC. Hippocrates is widely considered to be the father of Western medicine.

The development of the health care profession began in ancient Greece and continued in ancient Rome. There, Galen, who lived from AD 129 to about AD 217, made some of the greatest advancements of our understanding of the human body, how disease affects it, and how drugs work.

MRI, which stands for ***m****agnetic* ***r****esonance* ***i****maging,* is an example of an acronym.
Martin Barraud/Getty Images

Medical advances began to occur with greater frequency during the scientific revolution, adding to an already existing body of knowledge based on ancient Greek and Latin. In fact, some of the oldest terms have been in use for more than 2,000 years, such as terms for the skin, because these body parts were more easily viewed and studied.

Reason 2: Latin was the global language of the scientific revolution. The scientific revolution took place from the 16th through the 18th century. It was a time of enormous discoveries in physics, biology, chemistry, and human anatomy. This period saw a rapid increase in human knowledge thanks to the scientific method, which is a set of techniques developed in this period and still in use today using observation and experimentation for developing, testing, and proving or disproving hypotheses.

Medical research involving many different subjects, peoples, and places occurred all over Europe.

To allow people from England, Italy, Spain, Poland, and elsewhere to talk with one another, Latin became the language of scholarly discussion. It was already the common language of the Holy Roman Empire and Catholic Church, so many people already knew it well.

By using Latin to record and spread news of their discoveries, scientists of this time were able to share their new knowledge beyond the borders of their countries. At the same time, the number of medical words that sprang from Latin grew.

Reason 3: Dead languages don't change. "Fine," you think. "The language of medicine is based on Greek and Latin. But why do we keep using it? No one speaks either of these languages anymore. Why don't we just use English?"

The reason we keep using Greek and Latin is exactly that—no one speaks them anymore. All spoken languages change over time. Take the English word *green,* for instance, and its non-color-related meaning. In the past 20 or so years, the word *green* has become understood to mean *environmentally responsible,* as in the phrase *green energy.* Before that, the term was widely understood to mean something different: *immature* or *inexperienced,* such as "I just started this job, so I am still a little *green.*" Dead languages, which aren't spoken anymore, have an advantage because they don't change. There is no worry that words will change their meaning over time.

The foundations of Western medicine were laid in Greece and Rome.
Marco Simoni/Getty Images

Learning Outcome 1.2 Exercises

EXERCISE 1 True or false questions. Indicate true answers with a T and false answers with an F.

1. Medical language is made up primarily, but not exclusively, of words taken from two ancient languages: Greek and Latin. ____
2. Some other sources of medical language include eponyms, acronyms, and modern languages. ____
3. An example of an eponym is a medical term named after a famous patient who had the disease. ____
4. *MRI* is an example of an eponym. ____
5. Acronyms are used to say things more quickly. ____
6. Greek and Latin provide the basis of the language of medicine because Western medicine has its foundations in the Greek and Roman cultures. ____
7. The first people to systematically study the human body and develop theories about health and disease were the ancient Greeks. ____
8. Even though German was the global language of the scientific revolution, the Catholic Church forced all academics to use Latin, a language unknown to most people. ____
9. During the scientific revolution, Latin was used as the language of scholarly discussion in order to allow people across Europe to share their knowledge more quickly despite their different native languages. ____
10. A dead language is a language that people do not like to hear or speak anymore because it is no longer useful to a society. ____
11. Latin and Greek provide an excellent basis for medical terminology because dead languages do not change. ____

1.3 The Principles of Medical Language

How Does It Work?

Don't think of medical language as words to be memorized. Instead, they are sentences to be translated.[1]

Each medical word is a description of some aspect of health care. Think of it this way: If you were taking a trip to another country, you might try to memorize a few key words or phrases. It might be useful to know how to say common things such as "Where is the bathroom?" or "How much does this cost?" But if you were going to live in that country for a while, you wouldn't just try to memorize a few stock phrases, you would try to learn the language so you could understand what other people were saying.

The same is true of medical language. If you understand the way the language works, you will be able not only to know the meaning of a few individual words but also to break down and understand words you have never seen before, and even generate words on your own.

S. Olsson/PhotoAlto

> "**Don't think** of medical language as words to be **memorized**. Instead, they are sentences to be **translated**."[1]

1.4 How to Pronounce Terms Associated with Medical Language

The first step in learning any language is learning correct pronunciation. Like any other language, knowing and understanding medical terminology is useless unless you pronounce the terms correctly. With medical terms, the matter is complicated by two facts: First, many of the words come from foreign languages (and not just any foreign languages, but foreign languages no one speaks anymore). Second, some of the words are really long.

You probably have noticed the way native speakers of other languages pronounce certain letters differently. Think of the word *tortilla.* It takes a

[1] For more on this concept, see Lesley A. Dean-Jones, "Teaching Medical Terminology as a Classics Course," *Classical Journal* 93 (1998), pp. 290–96.

bit of experience with Spanish to know that two *l*s placed together (*ll*) are pronounced like a *y*. You say *tor-TEE-yah,* not *tor-TILL-ah.* The Spanish word for yellow, *amarillo,* follows this rule. It is pronounced ah-mah-REE-yoh. But the Texas town of the same name is pronounced very differently: am-ah-RIL-oh.

The same is true for medical language. The best way to learn terms is by encountering them in context. Once you get a little experience with the language, you will pick up the unique ways that certain letters are pronounced. In the meantime, refer to the accompanying chart of some commonly mispronounced letters.

LETTER	SOUND	EXAMPLE
c (before *a, o, u*)	k	*cardiac* (KAR-dee-ak) *contra* (KON-trah) *cut* (KUT)
c (before *e, i, y*)	s	*cephalic* (seh-FAL-ik) *cilium* (SIL-ee-um) *cyst* (SIST)
ch	k	*chiropractor* (KAI-roh-PRAK-tor)
g (before *a, o, u*)	g	*gamma* (GAM-ah) *goiter* (GOI-ter) *gutta* (GUT-tah)
g (before *e, i, y*)	j	*genetic* (jeh-NEH-tik) *giant* (JAI-int) *biology* (bai-AW-loh-jee)
ph	f	*pharmacy* (FAR-mah-see)
pn	n	*pneumonia* (noo-MOHN-yah)
pt (initial)	t	*pterigium* (tir-IH-jee-um)
rh, rrh	r	*rhinoplasty* (RAI-noh-PLAS-tee) *hemorrhage* (HEH-moh-rij)
x (initial)	z	*xeroderma* (ZER-oh-DER-mah)

Syllable Emphasis

Every medical term is constructed from syllables. Another thing that can affect the way words are pronounced is which syllable or syllables should be stressed, or emphasized. You must always make sure to put the emphasis on the correct syllable.

For example, consider that last phrase: *Put the emphasis on the right syllable.* The correct way to pronounce it would be:

> PUT the EM-fah-sis on the RAIT SIL-ah-bul.

It would sound funny to say:

> PUT the em-FAH-sis on the RAIT si-LAH-bul.

Knowing which syllable to emphasize can seem tricky but is actually pretty easy. Usually, for the sake of emphasis, the only syllables that you need to focus on are the last three syllables. So, starting at the end of the word, count back three syllables.

When it comes to emphasizing the correct syllable, the basic rule is this: In most words, the emphasis usually falls on the third-to-last syllable (the *antepenult,* if you are keeping track).

> *Cardiac* is split into three syllables:
> car / di / ac.
>
> Count backward three syllables from the end of the word to figure out which syllable gets emphasized: *car.*
>
> Therefore, the word is pronounced **KAR** / dee / ak.
>
> *Cardiology* is split into five syllables:
> car / di / o / lo / gy.
>
> Count backward three syllables from the end of the word to figure out which syllable gets emphasized: *o.*
>
> Therefore, the word is pronounced kar / dee / **AW** / loh / jee.

It gets tricky when a word remains unchanged except for the addition or subtraction of only a few letters.

Two good examples are the words *colonoscopy* and *colonoscope.*

> *Colonoscopy* is split into five syllables:
> co / lon / o / sco / py.
>
> Count backward three syllables from the end of the word to figure out which syllable gets emphasized: *o.*

Therefore, the word is pronounced koh / lon / **AW** / skoh / pee.

Colonoscope is split into four syllables: co / lon / o / scope.

Count backward three syllables from the end of the word to figure out which syllable gets emphasized: *lon*.

Therefore, the word is pronounced koh / **LAWN** / oh / skohp.

Notice how easy it is to spot the pronunciation change if you focus on counting backward from the end of the word?

As with any rule, there are countless exceptions and technicalities. That said, the easiest way to master pronunciation is not to learn countless rules, but instead to *practice pronouncing words.* Learn this one rule—let's call it the three-syllable rule—and make sure you take note of the pronunciations offered throughout the chapters. Don't just read them silently! Pronounce the words out loud. The more times you practice saying a word, the more comfortable and natural you will feel when you have to use it for real.

But make sure you are pronouncing correctly. Practice does *not* make perfect; practice makes permanent. Whatever you do over and over will be cemented in your brain, so make sure you do it right. *Perfect* practice makes perfect.

Learning Outcome 1.4 Exercises

EXERCISE 1 Identify the correct pronunciation for the underlined syllable.

EXAMPLE: thora**co**centesis *answer: koh (the c is hard because it is followed by an o)*
thora**cen**tesis *answer: sin (the c is soft because it is followed by an i)*

_____ 1.	**gut**	a. jut	b. gut
_____ 2.	di**git**	a. jit	b. git
_____ 3.	**gag** reflex	a. jag	b. gag
_____ 4.	dermatolo**gy**	a. jee	b. gee
_____ 5.	**ge**neticist	a. jen	b. gen
_____ 6.	**go**nad	a. joh	b. goh
_____ 7.	colla**gen**	a. jen	b. gen
_____ 8.	**phar**macist	a. par	b. far
_____ 9.	**cu**ticle	a. kyoo	b. suh
_____ 10.	**cor**nea	a. kor	b. sor
_____ 11.	**cath**eter	a. kath	b. sath
_____ 12.	on**co**logy	a. kaw	b. saw

Learning Outcome 1.4 Exercises

_____ 13.	genet**icist**	a. kist	b. sist
_____ 14.	pharma**cist**	a. kist	b. sist
_____ 15.	**cys**tic fibrosis	a. kis	b. sis
_____ 16.	**cho**lera	a. kawl	b. chohl
_____ 17.	psy**cho**sis	a. koh	b. choh
_____ 18.	pneumato**cele**	a. keel	b. seel
_____ 19.	**rheu**matoid arthritis	a. roo	b. rhee-yoo
_____ 20.	**pneu**matocele	a. noo	b. puh-noo
_____ 21.	**pter**ion	a. tir	b. puh-tir
_____ 22.	**xer**osis	a. zer	b. ex-er
_____ 23.	en**ceph**alitis	a. kep	b. sef
_____ 24.	**cirrho**sis	a. kir-hoh	b. sir-oh

EXERCISE 2 Indicate which syllable(s) is emphasized when pronounced.

EXAMPLE: bronchitis bron**chi**tis

1. cholera _____
2. cornea _____
3. cuticle _____
4. catheter _____
5. collagen _____
6. anemia _____
7. oncology _____
8. optometry _____
9. rheumatoid _____
10. geneticist _____
11. dermatology _____
12. psychotherapist _____

1.5 Parts Used to Build Medical Language

Just as any language has nouns, verbs, and adjectives, the language of medicine is made up of three main building blocks: roots, suffixes, and prefixes. Medical language is constructed by combining a root with a suffix and often a prefix.

Root—foundation or subject of the term

Suffix—ending that gives essential meaning to the term

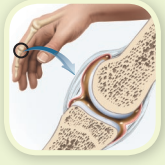
Prefix—added to the beginning of a term when needed to further modify the root

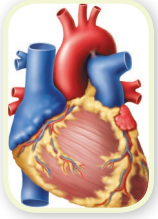
Common Roots

A root is the foundation of any medical term. Roots function like nouns in the language of medicine. It is the base, or subject, of a word—it is what the word is about. Most roots refer to things such as body parts, organs, and fluids.

There are a few types of roots in medical language. In the roots that follow, notice that a slash divides the last letter from the rest of the word (as in *arthr/o*). The final letter in these roots is called a *combining vowel;* these are discussed in detail later in the chapter. For now, just know that the final letter occurs in some words and not in others. Whenever possible, the examples provided include some words that have, and some that don't have, the combining vowel. Don't worry about what the example words mean. This is just to get you used to seeing the roots in context.

Some meanings have only one potential root.

ROOT	DEFINITION	EXAMPLES
arthr/o AR-throh	joint	*arthroscope, arthritis* 

ROOT	DEFINITION	EXAMPLES
cardi/o KAR-dee-oh	heart	*cardiology, pericardium* 
gastr/o GAS-tro	stomach	*gastrointestinal, gastritis* 

Some meanings have a few similar-sounding potential roots. Why? Some suffixes just sound better when attached to another root. Look at the examples in the chart below and switch the roots around—*hematorrhage* and *hemoma.* The meanings are the same, but they sure sound funny.

ROOT	DEFINITION	EXAMPLES
hem/o HEE-moh	blood	*hemorrhage* 
hemat/o heh-MAH-toh		*hematoma*

Some meanings have a couple of potential roots that are completely different but mean the same thing. This is because one word comes from Greek and the other comes from Latin. Normally, however, one of the

roots is much more commonly used than the other. Of the roots below, *myo* is used much more often than *musculo.*

ROOT	DEFINITION	EXAMPLES
my/o MAI-oh	muscle	*myocardial, myalgia*
muscul/o MUS-kyoo-loh		*musculoskeletal, muscular*

Some meanings have several potential roots that mean the same thing. Some are similar, and some are completely different. These are basically a combination of the two previous categories. These meanings each have a couple of similar roots *as well as* at least one root from Greek and one from Latin.

ROOT	DEFINITION	EXAMPLES
derm/o DER-moh	skin	*dermoscopy, dermis*
dermat/o der-MAT-oh		*dermatology, dermatitis*
cutane/o kyoo-TAY-nee-oh		*subcutaneous*
pneum/o NOO-moh	lung	*pneumotomy*

ROOT	DEFINITION	EXAMPLES
pneumon/o noo-MAW-noh	lung	*pneumonia, pneumonitis*
pulmon/o PUL-maw-noh		*pulmonologist, cardiopulmonary*

Question: Why doesn't each meaning have only one potential root?
Answer: The main reason multiple roots are available is to provide *options.* Some suffixes simply sound better or are easier to say when they are combined with one root rather than another.

GENERAL PURPOSE ROOTS

This list contains roots that will recur often in subsequent chapters. It is important to learn these roots now.

ROOT	DEFINITION	EXAMPLES
gen/o JIN-oh	creation, cause	*pathogenic*
hydr/o HAI-droh	water	*hydrophobia, dehydration*
morph/o MOR-foh	shape, change	*morphology*
myc/o MAI-koh	fungus	*dermatomycosis*
necr/o NEK-roh	death	*necrosis*
orth/o OR-thoh	straight	*orthodontist*
path/o PAH-thoh	suffering, disease	*pathology*
phag/o FAY-goh	eat	*aphagia*
plas/o PLAS-oh	formation	*hyperplasia*
py/o PAI-oh	pus	*pyorrhea, pyemia*
scler/o SKLEH-roh	hard	*scleroderma*

Brand X Pictures/ Getty Images

ROOT	DEFINITION	EXAMPLES
sten/o STIH-noh	narrowing	*stenosis*  kalus/Getty Images
troph/o TROH-foh	nourishment, development	*trophology, hypertrophy*
xen/o ZEE-noh	foreign	*xenograft*
xer/o ZEH-roh	dry	*xerosis, xerasia*

Common Suffixes

A *suffix* is a word part placed at the end of a word. The word *suffix* literally means *to attach (fix) after or below (sub,* which if you say it fast starts to sound like *suff*). As roots function as nouns, so suffixes function as verbs in the language of medicine. They describe something the root is doing or something that is happening to the root.

There are many types of suffixes in medical language. In general, they can be divided into two basic groups: simple and complex.

SIMPLE SUFFIXES

These suffixes (as their name suggests) are basic and are used to turn a root into a complete word.

Adjective. These suffixes turn the root they follow into an adjective. Thus, they all mean *pertaining to* or something similar to that.

SUFFIX	DEFINITION	EXAMPLES
-ac ak	pertaining to	*cardiac*
-al al		*skeletal*
-ar ar		*muscular*
-ary ar-ee		*pulmonary*
-eal ee-al		*esophageal*
-ic ik		*medic*
-ous us		*subcutaneous*
-tic tik		*neurotic*

Noun. All these suffixes turn the root they are added to into nouns.

SUFFIX	DEFINITION	EXAMPLES
-ia ee-ah	condition	*pneumonia*
-ism iz-um		*autism*
-ium ee-um	tissue, structure	*pericardium*
-y ee	condition, procedure, process	*hypertrophy*

Diminutive. When added to a root, these suffixes transform a term's meaning to a smaller version of the root. In English, for example, the suffix *-let* is diminutive. A *booklet* is a *little book.* In Spanish, the suffix *-ita* is diminutive. *Señora* is the Spanish word for *lady,* so *señorita* therefore means *little lady.*

SUFFIX	DEFINITION	EXAMPLES
-icle ik-el	small	*ventricle*
-ole ohl		*arteriole*
-ula yoo-lah		*uvula*
-ule yool		*pustule*

COMPLEX SUFFIXES

Complex suffixes aren't necessarily more difficult to understand than simple suffixes. They just have more parts. Sometimes, these suffixes are referred to as compound or combination suffixes because the suffixes themselves are put together from other suffixes, roots, and prefixes.

Following is an example.

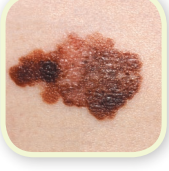
> The suffix *-y* means *condition, process*, or *procedure.* When combined with *tom/o,* a root meaning *to cut,* the result is the complex suffix *-tomy,* which means *a cutting procedure* or *incision.*
>
> *tom/o* (cut) + *-y* (process, procedure) = *-tomy* = a cutting procedure or incision
>
> But you can take it a step further. If you add the prefix *ec-* to *-tomy,* you will create the complex suffix *-ectomy,* which means *to cut out* or *to surgically remove something.*
>
> *ec-* (out) + *tom/o* (cut) + *-y* (process, procedure) = *-ectomy* = a cutting out procedure or surgical removal

Following are some lists of some categories of complex suffixes. Some complex suffixes are professional terms.

SUFFIX	DEFINITION	EXAMPLES
-iatrics ee-AH-triks	medical science	*pediatrics*
		 **pediatrics** Rido/Shutterstock
-iatry AI-ah-tree		*psychiatry*
-iatrist AI-ah-trist	specialist in medicine of	*psychiatrist*
-ist ist	specialist	*dentist*
-logist loh-jist	specialist in the study of	*psychologist*
		 **psychologist** Don Hammond/ Design Pics
-logy loh-jee	study of	*psychology*

Some complex suffixes describe symptoms, diseases, or conditions that are either mentioned by patients or diagnosed by health professionals.

symptoms, diseases, and conditions

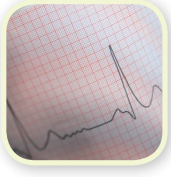
SUFFIX	DEFINITION	EXAMPLES
-algia AL-jah	pain	*myalgia*
-dynia DAI-nee-ah		*gastrodynia*
-cele SEEL	hernia (a bulging of tissue into an area where it doesn't belong)	*hydrocele*
-emia EE-mee-ah	blood condition	*leukemia*
		 **leukemia** Steve Gschmeissner/ Science Source
-iasis AI-ah-sis	presence of	*lithiasis*
-itis AI-tis	inflammation	*arthritis*
-lysis lih-sis	loosen, break down	*hemolysis*
-malacia mah-LAY-shah	abnormal softening	*osteomalacia*
-megaly MEH-gah-lee	enlargement	*hepatomegaly*
-oid OYD	resembling	*keloid*
-oma OH-mah	tumor	*melanoma*
		 **melanoma** Source: National Cancer Institute (NCI)
-osis OH-sis	condition	*thrombosis*

symptoms, diseases, and conditions *continued*

SUFFIX	DEFINITION	EXAMPLES
-pathy pah-thee	disease	*myopathy*
-penia PEE-nee-ah	deficiency	*leukopenia*
-ptosis puh-TOH-sis	drooping	*nephroptosis*
-rrhage RIJ	excessive flow	*hemorrhage*
-rrhagia RAY-jee-ah		*menorrhagia*
-rrhea REE-ah	flow	*diarrhea*
-rrhexis REK-sis	rupture	*metrorrhexis*
-spasm SPAZ-um	involuntary contraction	*myospasm*

Some complex suffixes describe tests and treatments performed by health professionals. Although it is convenient to place tests and treatments in the same category and label them as "procedures," it is important to distinguish between the two. A *test* is a *procedure done to gain more information in order to diagnose a problem.* A *treatment* is a *process done after a diagnosis to fix a problem.*

tests

SUFFIX	DEFINITION	EXAMPLES
-centesis sin-TEE-sis	puncture	*amniocentesis*
-gram gram	written record	*cardiogram*  Stockbyte/Getty Images
-graph graf	instrument used to produce a record	*cardiograph*
-graphy grah-fee	process of recording	*cardiography*
-meter mee-ter	instrument used to measure	*cephalometer*

tests *continued*

SUFFIX	DEFINITION	EXAMPLES
-metry meh-tree	process of measuring	*cephalometry*
-scope skohp	instrument used to look	*arthroscope*
-scopy skoh-pee	process of looking	*arthroscopy*

treatments

SUFFIX	DEFINITION	EXAMPLES
-desis DEE-sis	binding, fixation	*arthrodesis*
-ectomy EK-toh-mee	removal	*vasectomy* 
-pexy PEK-see	surgical fixation	*retinopexy* 
-plasty PLAS-tee	reconstruction	*rhinoplasty*
-rrhaphy rah-fee	suture	*herniorrhaphy*
-stomy stoh-mee	creation of an opening	*colostomy*
-tomy toh-mee	incision	*dermotomy*

SINGULARS AND PLURALS

In English, the most common way to turn a word from singular to plural is to add an "s." The plural of *bag* is *bags,* for example. But there are other ways too. The plural of *goose* is *geese.* The plural of *mouse* is *mice.* The plural of *ox* is *oxen.* The plural of *sheep* is *sheep.*

The same is true for medical terms. Because medical words come from different languages, singular words become plural in a variety of ways.

SINGULAR	PLURAL	EXAMPLES	
-a	*-ae*	*vertebra* *larva*	*vertebrae* *larvae*
-ax	*-aces*	*thorax*	*thoraces*
-ex	*-ices*	*cortex*	*cortices*
-ix	*-ices*	*appendix*	*appendices*
-is	*-es*	*neurosis* *diagnosis*	*neuroses* *diagnoses*
-ma	*-mata*	*sarcoma* *carcinoma*	*sarcomata* *carcinomata*
-on	*-a*	*spermatozoon* *ganglion*	*spermatozoa* *ganglia*
-um	*-a*	*datum* *bacterium* *ovum*	*data* *bacteria* *ova*
-us	*-i*	*nucleus* *alveolus* *thrombus*	*nuclei* *alveoli* *thrombi*
-y	*-ies*	*biopsy* *myopathy*	*biopsies* *myopathies*

Common Prefixes

A *prefix* is a word part placed at the beginning of a word. The word *prefix* literally means *to attach (fix) before (pre)*. Prefixes function like adjectives in the language of medicine. They supply additional information as needed. In the same way that not every sentence has an adjective, not every medical term has a prefix.

There are many types of prefixes in medical language. Following are a few examples.

NEGATION PREFIXES

Some prefixes negate things:

negation

PREFIX	MEANING	EXAMPLES
a- ay	not	*aphasia*
an- an		*anemia*
anti- AN-tee	against	*antibiotics*
contra- KON-trah	against	*contraceptive*
de- dee	down, away from	*dehydration*

TIME OR SPEED PREFIXES

Some prefixes describe time or speed:

time/speed

PREFIX	MEANING	EXAMPLES
ante- an-tee	before	*antepartum*
pre- pree		*precondition*
pro- proh	before, on behalf of	*probiotic*
post- pohst	after	*postpartum*
brady- brah-dih	slow	*bradycardia*
tachy- tak-ih	fast	*tachycardia*
re- ree	again	*rehabilitation*

probiotic

Bob Coyle/ McGraw-Hill Higher Education

DIRECTION OR POSITION PREFIXES

Some prefixes describe direction or position:

direction/position

PREFIX	MEANING	EXAMPLES
ab- ab	away	*abduct*
ad- ad	toward	*adrenaline*
circum- sir-kum	around	*circumcision*
peri- per-ee		*pericardium*

direction/position *continued*

PREFIX	MEANING	EXAMPLES
dia- dai-ah	through	*diagnostic*
trans- tranz		*translate*
e- eh	out	*evoke*
ec- ek		*ectopic*
ex- eks		*exhale*
ecto- ek-toh	outside	*ectoderm*
exo- ek-soh		*exoskeleton*
extra- eks-trah		*extracorporeal*
en- en	in, inside	*enema*
endo- en-doh		*endocrine*
intra- in-trah		*intravenous*
epi- eh-pee	upon	*epididymus*
inter- in-ter	between	*intercostal*
sub- sub	beneath	*subcutaneous*

intravenous
mmmx/123RF

SIZE OR QUANTITY PREFIXES

Some prefixes describe size or quantity:

size/quantity

PREFIX	MEANING	EXAMPLES
bi- bai	two	*bilateral*
hemi- heh-mee	half	*hemiplegia*
semi- seh-mee		*semilunar*

size/quantity *continued*

PREFIX	MEANING	EXAMPLES
hyper- hai-per	over	*hyperthermia*
hypo- hai-poh	under	*hypothermia*
macro- mak-roh	large	*macrotia*
micro- mai-kroh	small	*microdontia*
mono- maw-noh	one	*monocyte*
uni- yoo-nee		*unisex*
oligo- aw-lih-goh	few	*oligomenorrhea*
pan- pan	all	*pancytopenia*
poly- pawlee	many	*polygraph*
multi- mul-tee		*multicellular*

GENERAL PREFIXES

Some prefixes are general:

general

PREFIX	MEANING	EXAMPLES
con- kon	with, together	*congestion*
sym- sim		*symmetry*
syn- sin		*syndrome*
dys- dis	bad	*dysentery*
eu- yoo	good	*euphoria*

congestion
iStockphoto/Getty Images

Learning Outcome 1.5 Exercises

EXERCISE 1 Match the root on the left with its definition on the right.

_____	1. gen/o	a.	shape, change
_____	2. necr/o	b.	creation, cause
_____	3. xer/o	c.	death
_____	4. morph/o	d.	dry
_____	5. troph/o	e.	eat
_____	6. plas/o	f.	foreign
_____	7. sten/o	g.	formation
_____	8. phag/o	h.	narrowing
_____	9. xen/o	i.	nourishment, development

EXERCISE 2 Translate the following roots.

1. hydr/o _____
2. orth/o _____
3. necr/o _____
4. myc/o _____
5. py/o _____
6. xer/o _____
7. path/o _____
8. scler/o _____
9. phag/o _____
10. xen/o _____

EXERCISE 3 Underline and define the roots in the following terms.

1. morphology _____
2. dysplasia _____
3. hypertrophic _____
4. teratogenic _____
5. mycosis _____
6. craniostenosis _____
7. angiosclerosis _____
8. pyarthrosis (2 roots) _____

EXERCISE 4 Identify the roots for the following definitions.

1. water _____
2. creation, cause _____
3. pus _____
4. straight _____
5. fungus _____
6. suffering, disease _____
7. hard _____
8. formation _____

EXERCISE 5 Match the suffix on the left with its definition on the right. Some definitions will be used more than once.

_____	1. -ium	a.	condition
_____	2. -icle	b.	pertaining to
_____	3. -ous	c.	tissue, structure
_____	4. -ac	d.	small
_____	5. -ia		
_____	6. -eal		

EXERCISE 6 Translate the following suffixes.

1. -y _____
2. -ism _____
3. -al _____
4. -ic, -tic _____
5. -ar, -ary _____
6. -ole, -ule, -ula _____

EXERCISE 7 Underline and define the suffix in the following terms.

1. cardiac _____
2. gastric _____

Learning Outcome 1.5 Exercises

3. neurotic _____
4. skeletal _____
5. esophageal _____
6. muscular _____
7. pulmonary _____
8. cardiovascular _____
9. cutaneous _____
10. arteriole _____
11. ventricle _____
12. pustule _____
13. uvula _____
14. pneumonia _____
15. autism _____
16. pericardium _____
17. hypertrophy _____

EXERCISE 8 Match the suffix on the left with its definition on the right. Some definitions will be used more than once.

_____ 1. -logy	a.	medical science
_____ 2. -logist	b.	specialist
_____ 3. -ist	c.	specialist in the medicine of
_____ 4. -iatrist	d.	specialist in the study of
_____ 5. -iatry	e.	study of

EXERCISE 9 Identify the suffixes for the following definitions.

1. tissue, structure _____
2. condition, process, procedure _____
3. condition (3 possible options) _____
4. small or any suffix that makes the root a diminutive, or smaller, version of the root (choose 3 of the 4 possible options) _____
5. pertaining to (or any suffix that makes a root into an adjective) (choose 4 of the 8 possible options) _____

EXERCISE 10 Translate the following suffixes.

1. -logy _____
2. -logist _____
3. -ist _____
4. -iatrist _____
5. -iatry _____
6. -iatrics _____

EXERCISE 11 Underline and define the suffix in the following terms.

1. cardiology _____
2. cardiologist _____
3. pathology _____
4. pathologist _____
5. psychology _____
6. psychologist _____
7. dentist _____
8. psychiatry _____
9. psychiatrist _____
10. pediatrics _____

EXERCISE 12 Identify the suffixes for the following definitions.

1. specialist _____
2. specialist in the study of _____
3. study of _____
4. specialist in the medicine of _____
5. medical science (2 suffixes) _____

Learning Outcome 1.5 Exercises

EXERCISE 13 Match the suffix on the left with its definition on the right. Some definitions will be used more than once.

_____	1. -oid	a. deficiency
_____	2. -iasis	b. drooping
_____	3. -cele	c. flow
_____	4. -penia	d. hernia
_____	5. -rrhea	e. loosen, break down
_____	6. -lysis	f. presence of
_____	7. -ptosis	g. resembling
_____	8. -rrhexis	h. rupture

EXERCISE 14 Translate the following suffixes.

1. -spasm _____
2. -megaly _____
3. -oma _____
4. -emia _____
5. -itis _____
6. -osis _____
7. -pathy _____
8. -algia _____
9. -dynia _____
10. -malacia _____
11. -rrhage, -rrhagia _____

EXERCISE 15 Underline and define the suffix in the following terms.

1. myospasm _____
2. myopathy _____
3. cardiomegaly _____
4. gastritis _____
5. gastralgia _____
6. gastrodynia _____
7. gastromalacia _____
8. hematoma _____
9. melanoma _____
10. hemolysis _____
11. hemorrhage _____
12. hydrocele _____
13. leukopenia _____
14. stenosis _____

EXERCISE 16 Identify the suffixes for the following definitions.

1. tumor _____
2. resembling _____
3. blood condition _____
4. presence of _____
5. deficiency _____
6. hernia _____
7. drooping _____
8. flow _____
9. rupture _____

EXERCISE 17 Match the suffix on the left with its definition on the right. Some definitions will be used more than once.

_____	1. -meter	a. instrument used to look
_____	2. -metry	b. instrument used to measure
_____	3. -scope	c. instrument used to produce a record
_____	4. -scopy	d. process of looking
_____	5. -graph	e. process of measuring
_____	6. -graphy	f. process of recording
_____	7. -gram	g. puncture
_____	8. -centesis	h. written record

Learning Outcome 1.5 Exercises

EXERCISE 18 Translate the following suffixes.

1. -meter _____
2. -metry _____
3. -scope _____
4. -scopy _____
5. -graph _____
6. -graphy _____
7. -gram _____
8. -centesis _____

EXERCISE 19 Underline and define the suffix in the following terms.

1. audiogram _____
2. audiograph _____
3. audiometer _____
4. gastroscope _____
5. audiography _____
6. audiometry _____
7. gastroscopy _____
8. ovariocentesis _____

EXERCISE 20 Identify the suffixes for the following definitions.

1. instrument used to look _____
2. process of looking _____
3. instrument used to measure _____

_____

4. process of measuring _____
5. written record _____
6. instrument used to produce a record _____

_____

7. process of recording _____
8. puncture _____

EXERCISE 21 Match the suffix on the left with its definition on the right.

_____ 1. -plasty	a. binding
_____ 2. -tomy	b. creation of an opening
_____ 3. -ectomy	c. incision
_____ 4. -stomy	d. reconstruction
_____ 5. -pexy	e. removal
_____ 6. -desis	f. surgical fixation
_____ 7. -rrhaphy	g. suture

EXERCISE 22 Translate the following suffixes.

1. -plasty _____
2. -tomy _____
3. -ectomy _____
4. -stomy _____
5. -pexy _____
6. -desis _____
7. -rrhaphy _____

EXERCISE 23 Underline and define the suffix in the following terms.

1. myoplasty _____
2. tracheotomy _____
3. tracheostomy _____
4. gastrectomy _____
5. gastropexy _____
6. myodesis _____
7. myorrhaphy _____

EXERCISE 24 Identify the suffixes for the following definitions.

1. reconstruction _____
2. removal _____
3. incision _____
4. creation of an opening _____

Learning Outcome 1.5 Exercises

5. surgical fixation _____
6. binding _____
7. suture _____

EXERCISE 25 Match the singular suffix on the left with the suffix that will make the same term plural on the right. Some plural suffixes will be used more than once.

	Singular	Plural
_____	1. -ax	a. -a
_____	2. -ix	b. -aces
_____	3. -ex	c. -ae
_____	4. -ma	d. -es
_____	5. -is	e. -i
_____	6. -a	f. -ices
_____	7. -um	g. -ies
_____	8. -on	h. -mata
_____	9. -y	
_____	10. -us	

EXERCISE 26 Match the prefix on the left with its definition on the right. Some definitions will be used more than once.

_____	1. pre-	a. after
_____	2. post-	b. again
_____	3. re-	c. against
_____	4. contra-	d. before
_____	5. anti-	e. before, on behalf of
_____	6. pro-	f. down, away from
_____	7. de-	g. fast
_____	8. a-	h. not
_____	9. an-	i. slow
_____	10. ante-	
_____	11. tachy-	
_____	12. brady-	

EXERCISE 27 Translate the following prefixes.

1. pre- _____
2. post- _____
3. re- _____
4. contra- _____
5. anti- _____
6. pro- _____
7. de- _____
8. a- _____
9. an- _____
10. ante- _____
11. tachy- _____
12. brady- _____

EXERCISE 28 Underline and define the prefix in the following terms.

1. prenatal _____
2. postnatal _____
3. antepartum _____
4. probiotic _____
5. antibiotic _____
6. contraceptive _____
7. dehydration _____
8. rehabilitation _____
9. bradypnea _____
10. tachypnea _____
11. apnea _____

EXERCISE 29 Identify the prefixes for the following definitions.

1. again _____
2. after _____
3. slow _____

Learning Outcome 1.5 Exercises

4. fast _____
5. down, away from _____
6. before, on behalf of _____
7. before (2 prefixes) _____
8. not (2 prefixes) _____
9. against (2 prefixes) _____

EXERCISE 30 Match the prefix on the left with its definition on the right. Some definitions will be used more than once.

_____ 1. ab-	a. out
_____ 2. ad-	b. around
_____ 3. peri-	c. upon
_____ 4. trans-	d. beneath
_____ 5. ec-	e. away
_____ 6. ecto-	f. between
_____ 7. extra-	g. in, inside
_____ 8. en-	h. toward
_____ 9. intra-	i. through
_____ 10. epi-	j. outside
_____ 11. sub-	
_____ 12. inter-	

EXERCISE 31 Translate the following prefixes.

1. sub- _____
2. inter- _____
3. circum- _____
4. dia- _____
5. ab- _____
6. ad- _____
7. epi- _____
8. e-, ec-, ex- _____
9. ecto-, exo-, extra- _____
10. en-, endo-, intra- _____

EXERCISE 32 Underline and define the prefix in the following terms.

1. transdermal _____
2. exhale _____
3. extravascular _____
4. circumcision _____
5. pericardium _____
6. pericarditis _____
7. subcutaneous _____
8. exoskeleton _____
9. ectoderm _____
10. ectopic _____
11. intercostal _____
12. intravenous _____
13. intradermal _____
14. epidermal _____
15. epicardium _____
16. endometrium _____
17. abduct _____
18. evoke _____
19. diarrhea _____
20. enuresis _____

EXERCISE 33 Identify the prefixes for the following definitions.

1. beneath _____
2. between _____
3. upon _____
4. away _____
5. toward _____
6. around (2 prefixes) _____
7. through (2 prefixes) _____
8. in, inside (3 prefixes) _____
9. out (3 prefixes) _____
10. outside (3 prefixes) _____

Learning Outcome 1.5 Exercises

EXERCISE 34 Match the prefix on the left with its definition on the right. Some definitions will be used more than once.

_____ 1. bi-	a. all
_____ 2. uni-	b. few
_____ 3. multi-	c. half
_____ 4. micro-	d. large
_____ 5. macro-	e. many
_____ 6. mono-	f. one
_____ 7. poly-	g. over
_____ 8. hyper-	h. small
_____ 9. hemi-	i. two
_____ 10. hypo-	j. under
_____ 11. pan-	
_____ 12. oligo-	

EXERCISE 35 Translate the following prefixes.

1. bi- _____
2. uni- _____
3. multi- _____
4. micro- _____
5. macro- _____
6. mono- _____
7. poly- _____
8. hyper- _____
9. hemi- _____
10. hypo- _____
11. pan- _____
12. oligo- _____

EXERCISE 36 Underline and define the prefixes in the following terms.

1. unilateral _____
2. bilateral _____
3. monocyte _____
4. oliguria _____
5. polyuria _____
6. polygraph _____
7. hyperpnea _____
8. hypopnea _____
9. macrocephaly _____
10. microcephaly _____
11. pancytopenia _____
12. heminephrectomy _____
13. panhypopituitarism (two prefixes) _____

EXERCISE 37 Identify the prefixes for the following definitions.

1. large _____
2. small _____
3. over _____
4. under _____
5. two _____
6. all _____
7. few _____
8. one (2 prefixes) _____
9. many (2 prefixes) _____
10. half (2 prefixes) _____

EXERCISE 38 Match the prefix on the left with its definition on the right. Some definitions will be used more than once.

_____ 1. syn-	a. bad
_____ 2. sym-	b. good
_____ 3. con-	c. with, together
_____ 4. dys-	
_____ 5. eu-	

Learning Outcome 1.5 Exercises

EXERCISE 39 Translate the following prefixes.

1. syn- _____
2. sym- _____
3. con- _____
4. dys- _____
5. eu- _____

EXERCISE 40 Underline and define the prefix in the following terms.

1. congenital _____
2. congestion _____
3. dysuria _____
4. dyspnea _____
5. eupnea _____
6. euthyroid _____
7. syndrome _____
8. symmetry _____

EXERCISE 41 Identify the prefixes for the following definitions.

1. bad _____
2. good _____
3. with, together (3 prefixes) _____

1.6 How to Put Together Medical Terms

Putting It All Together

Now you know about roots, suffixes, and prefixes. There's an additional piece that often goes unnoticed: the *combining vowel (CV).* Take the root *cardio,* which means *heart.* That *o* on the end is optional. It is used when needed to make it easier to combine this root with other word parts. But if it is not needed, it can go away.

So when we say that a word part like *cardio* is a root, we're not speaking precisely. Technically, *cardio* is called a *combining form.* A combining form is a combination of a root with a combining vowel.

Do Use a Combining Vowel

To join a root to any suffix beginning with a consonant:

splen/o	spleen
-megaly	enlargement

So in the example above:

cardi would be the root (which doesn't change)

o would be the combining vowel (which can come or go as needed)

cardi/o would be the combining form (the slash is there to help you tell the difference between the root and combining vowel)

Note: O is by far the most common combining vowel. The letter *i* is a distant second.

ROOT	CV	SUFFIX	WORD	DEFINITION
splen	o	-megaly	splenomegaly	enlargement of the spleen

To join two roots together:

hepat/o	liver
splen/o	spleen
-megaly	enlargement

ROOT	CV	ROOT	CV	SUFFIX	WORD	DEFINITION
hepat	o	splen	o	-megaly	hepatosplenomegaly	enlargement of the liver and spleen

To join two roots together, ***even when*** *the second root begins with a vowel:*

gastr/o	stomach
enter/o	intestine
-logy	study of

ROOT	CV	ROOT	CV	SUFFIX	WORD	DEFINITION
gastr	o	enter	o	-logy	gastroenterology	study of the stomach and intestine

Don't Use a Combining Vowel

To join a root to a suffix that begins with a vowel:

hepat/o	liver
splen/o	spleen
cardi/o	heart
-ectomy	surgical removal
-itis	inflammation

ROOT	CV	SUFFIX	WORD	DEFINITION
hepat		-itis	hepatitis	inflammation of the liver
splen		-ectomy	splenectomy	surgical removal of the spleen
cardi		-itis	carditis	inflammation of the heart

Note: In the last word, the root ends with the same letter that begins the suffix (*cardi* + *itis*). In cases like this, you do not use a combining vowel, and you also drop the final vowel of the root.

Learning Outcome 1.6 Exercises

EXERCISE 1 Indicate whether a combining vowel is necessary, and explain why or why not.

EXAMPLE:

Root	Suffix	Combining Vowel?
splen/o	*-megaly*	☒ *Yes (suffix begins with a consonant)*
		☐ *No*

ROOT	SUFFIX	COMBINING VOWEL?
1. cardi/o	-gram	☐ Yes _____ ☐ No _____
2. gastr/o	-scope	☐ Yes _____ ☐ No _____
3. cardi/o	-logist	☐ Yes _____ ☐ No _____
4. cardi/o	-megaly	☐ Yes _____ ☐ No _____
5. gastr/o	-ic	☐ Yes _____ ☐ No _____
6. cardi/o	-itis	☐ Yes _____ ☐ No _____
7. gastr/o	-itis	☐ Yes _____ ☐ No _____
8. cardi/o + my/o	-tomy	☐ Yes _____ ☐ No _____

EXERCISE 2 Build a medical term from the information provided.

EXAMPLE:

Root	Suffix	Term
splen/o	*-megaly*	*splenomegaly*

ROOT	SUFFIX	TERM
1. cardi/o	-gram	
2. gastr/o	-scope	
3. cardi/o	-logist	
4. cardi/o	-megaly	
5. gastr/o	-dynia	
6. gastr/o	-itis	
7. gastr/o + esophag/o	-eal	

1.7 How Medical Terms Are Translated

Think of Medical Terms as Sentences

You can usually figure out the definition of a term by interpreting the

- suffix first
- then the prefix (if one is present)
- then the root or roots

How to translate:

1. Read the word.
2. Say the word out loud.
3. Break the word into parts (suffixes, roots, and prefixes).
4. Translate the parts.
5. Reassemble the pieces into a statement.

Example:
arthritis

1.	Read the word:	arthritis
2.	Say the word out loud:	ar-THRAI-tis
3.	Break the word into parts (suffixes, roots, and prefixes):	arthr / itis
4.	Translate the parts:	joint / inflammation
5.	Reassemble the pieces into one statement:	inflammation of the joint

Here's how this would look in a chart:

TERM	WORD ANALYSIS
1. arthritis	**3.** arthr / itis
2. ar-THRAI-tis	**4.** joint/inflammation
5. DEFINITION inflammation of the joint	

Some examples are shown to allow you to see the process at work. Don't worry about trying to learn the words themselves right now. They will be taught in later chapters. Right now, focus on getting comfortable with looking at medical terms, breaking them down, and then translating them. The biggest problem people have with medical terms is that they are intimidated by how long or how foreign they look. But if you don't panic and follow these five simple steps, you will be surprised at how quickly you will become comfortable with the language.

Group 1. This group is made up of relatively simple words. Most have just one root and one suffix, and the definition is easily deduced from the word analysis.

TERM	WORD ANALYSIS
arthritis ar-THRAI-tis	arthr / itis joint / inflammation
	
DEFINITION inflammation of the joint	
cardiology kar-dee-AW-loh-jee	cardio / logy heart / study of
DEFINITION study of the heart	
myalgia mai-AL-jah	my / algia muscle / pain
DEFINITION pain of muscle	

Group 2. This group of words contains slightly more complex words. The words in this section are made up of at least three parts—either multiple roots or a prefix, root, and suffix.

TERM	WORD ANALYSIS
cardiopulmonary KAR-dee-oh-PUL-mon-AR-ee	cardio / pulmon / ary heart / lung / pertaining to
DEFINITION pertaining to the heart and lungs	
dermatomycosis der-MAH-toh-mai-KOH-sis	dermato / myc / osis skin / fungus / condition
DEFINITION skin condition caused by fungus	
hyperplasia hai-per-PLAY-zhah	hyper / plas / ia over / formation / condition
DEFINITION overformation condition	
pericardium peh-ree-KAR-dee-um	peri / card / ium around / heart / tissue
DEFINITION tissue around the heart	

Learning Outcome 1.7 Exercises

EXERCISE 1 Underline and define the root in the following terms.

1. cardiology _____
2. arthritis _____
3. carditis _____
4. hepatitis _____
5. arthralgia _____
6. myalgia _____
7. myotomy _____
8. arthrectomy _____
9. myectomy _____

EXERCISE 2 Underline and define the suffix in the following terms.

1. cardiology _____
2. arthritis _____
3. carditis _____
4. hepatitis _____
5. arthralgia _____
6. myalgia _____
7. myotomy _____
8. arthrectomy _____
9. myectomy _____

EXERCISE 3 Translate the following terms.

EXAMPLE: sinusitis *inflammation of the sinuses*

1. cardiology _____
2. arthritis _____
3. carditis _____
4. hepatitis _____
5. arthralgia _____
6. myalgia _____
7. myotomy _____
8. arthrectomy _____
9. myectomy _____

Additional exercises available in connect®

Chapter Review exercises, along with additional practice items, are available in Connect!

review of prefixes, roots, and suffixes

PREFIXES	ROOTS	SUFFIXES
a- = not	**arthr/o** = joint	**-ac** = pertaining to
ab- = away	**cardi/o** = heart	**-al** = pertaining to
ad- = toward	**derm/o, dermat/o** = skin	**-algia** = pain
an- = not	**enter/o** = small intestine	**-ar, -ary** = pertaining to
ante- = before	**gastr/o** = stomach	**-cele** = hernia
anti- = against	**gen/o** = generation, cause	**-centesis** = puncture
bi- = two	**hem/o**, **hemat/o** = blood	**-desis** = binding
brady- = slow	**hepat/o** = liver	**-dynia** = pain
circum- = around	**hydr/o** = water	**-eal** = pertaining to
con- = with, together	**morph/o** = shape, change	**-ectomy** = removal
contra- = against	**muscul/o** = muscle	**-emia** = blood condition
de- = down, away from	**my/o** = muscle	**-gram** = written record
dia- = through	**myc/o** = fungus	**-graph** = instrument used to produce a record
dys- = bad	**necr/o** = death	**-graphy** = process of recording
e- = out	**neur/o** = nerve	**-ia** = condition
ec- = out	**orth/o** = straight	**-iasis** = presence of
ecto- = outside	**path/o** = suffering, disease	**-iatrics** = medical science
en- = in, inside	**phag/o** = eat	**-iatrist** = specialist in medicine of
endo- = in, inside	**plas/o** = formation	**-iatry** = medical science
epi- = upon	**pneum/o, pneumon/o** = lung	**-ic** = pertaining to
eu- = good	**pulmon/o** = lung	**-icle** = small
ex- = out	**py/o** = pus	**-ism** = condition
exo- = outside	**scler/o** = hard	**-ist** = specialist
extra- = outside	**sten/o** = narrowing	**-itis** = inflammation
hemi- = half	**troph/o** = nourishment, development	**-ium** = tissue, structure
hyper- = over	**vas/o, vascul/o** = blood vessel	**-logist** = specialist in the study of
hypo- = under	**xen/o** = foreign	**-logy** = study of
inter- = between	**xer/o** = dry	**-lysis** = loosen, break down
intra- = in, inside		**-malacia** = abnormal softening
macro- = large		**-megaly** = enlargement
micro- = small		**-meter** = instrument used to measure
mono- = one		**-metry** = process of measuring
multi- = many		**-oid** = resembling
oligo- = few		**-ole** = small
pan- = all		**-oma** = tumor
peri- = around		**-osis** = condition
poly- = many		**-ous** = pertaining to
post- = after		**-pathy** = disease
pre- = before		**-penia** = deficiency
pro- = before, on behalf of		**-pexy** = surgical fixation
re- = again		**-plasty** = reconstruction

review of prefixes, roots, and suffixes *continued*

PREFIXES	ROOTS	SUFFIXES
semi- = half		**-ptosis** = drooping
sub- = beneath		**-rrhage, -rrhagia** = excessive flow
sym- = with, together		**-rrhaphy** = suture
syn- = with, together		**-rrhea** = flow
tachy- = fast		**-rrhexis** = rupture
trans- = through		**-scope** = instrument used to look
uni- = one		**-scopy** = process of looking
		-spasm = involuntary contraction
		-stomy = creation of an opening
		-tic = pertaining to
		-tomy = incision
		-ula, -ule = small
		-y = condition, procedure, process

Introduction to Health Records

2

Introduction

Medical records save lives. The information they contain can be critical in patient care. For example, documentation of a patient's allergy to a medication can prevent an adverse, potentially fatal, outcome. Whether found in a paper chart or an electronic health record (EHR), the information contained in a patient's records serves as a road map to his or her health history, detailing previous illnesses and treatments, continuing medical problems, history of family illnesses, and any current medications. These data provide a clearer picture of the best route to take in future treatment of the patient. With an increasingly busy and time-constrained patient culture, seeking care in multiple places, such as emergency departments (EDs) and urgent care clinics, has become more commonplace. This further fuels the need for thorough documentation because it is the bedrock of solid communication among health care providers.

Medical records are an indispensable component of medicine, so it is prudent to be well acquainted with their general layout. There are countless types of medical documents or records in medicine, from routine wellness visit notes to hospital discharge summaries. Even x-ray reports are medical notes.

JGI/Daniel Grill/Getty Images

To the untrained eye, the layout or sheer volume of information of a medical note may be intimidating. In reality, most medical notes share a consistent, logical organization or layout as well as characteristic language. We addressed the concept of medical language in the first chapter, and it will be the main focus of this textbook. In this chapter, we discuss the organization or layout of medical documents. Having a good grasp on the general flow of medical notes allows for successful navigation through the different elements of a patient's chart so you may find any relevant details you seek.

Learning Outcomes

Upon completion of this chapter, you will be able to:

2.1 Summarize the **SOAP method.**

2.2 Identify the types of **health records.**

2.3 Use common terms on **health records.**

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2.1 The SOAP Method

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Medical notes share a consistent pattern in their organization and layout. This pattern reflects the thought process of health professionals in general. Patient visits typically revolve around addressing a problem. Providers employ a logical approach to solving these problems. In its most rudimentary form, this pattern is presented as what is known as a *SOAP note. SOAP* is an acronym that stands for the four general parts of a medical note: **s**ubjective, **o**bjective, **a**ssessment, and **p**lan.

Diagnostic work in medicine is very similar to the investigative work of a detective. By collecting data and using deductive reasoning, a health care provider can make the most accurate assessment of the patient's problem.

S The first part of the note is the **subjective** part. It is subject to how a patient experiences and personally describes his or her problem as well as personal and family medical histories. Put simply, it is the problem in the patient's own words. The subjective data include the duration of the problem, the quality of the problem, and any exacerbating or relieving factors for that problem.

O The next step in the investigative process involves collecting **objective** data. Objective data comprise the patient's physical exam, any laboratory findings, and imaging studies performed at the visit.

A Upon gathering all the pertinent information, the health care provider formulates a logical analysis. This is known as the **assessment.** An assessment could be a diagnosis, an identification of a problem, or a list of possibilities for the diagnosis, which is known as a *differential diagnosis.*

P The provider then formulates a **plan,** or a course of action consistent with his or her assessment. The plan could be a treatment with medicine or a procedure. It could also consist of collecting further data to help arrive at a more accurate diagnosis.

The process of collecting subjective history, gathering objective data, formulating an assessment, and developing an action plan is repeated in every health care visit across all disciplines of medicine. It is the baseline of thought in medicine. Consequently, health care records reflect this thought process.

Learning Outcome 2.1 Exercises

Additional exercises available in connect

EXERCISE 1 Match the part of the medical SOAP note on the left with its description on the right.

_____ 1. subjective	a.	cause of the problem
_____ 2. objective	b.	treatment with medicine or a procedure
_____ 3. assessment	c.	a description of the problem in the patient's own words
_____ 4. plan	d.	data collected to assist in understanding the nature of the problem

EXERCISE 2 Multiple-choice questions. Select the correct answer.

1. The *S* in *SOAP* stands for
   a. scrutinize c. subjective
   b. studies d. survey
2. The *O* in *SOAP* stands for
   a. objective c. order
   b. opinion d. outline
3. The *A* in *SOAP* stands for
   a. action c. arrangement
   b. appraisal d. assessment
4. The *P* in *SOAP* stands for
   a. plan c. prognosis
   b. procedure d. purpose
5. A SOAP note is
   a. a pattern used in writing medical notes
   b. a way of thinking
   c. all of these
   d. none of these
6. A *diagnosis* is
   a. a list of possible causes of the patient's problem or complaint
   b. ordering more labs
   c. the identification of the actual problem
   d. treatment with medicine or a procedure
7. A *differential diagnosis* is
   a. a list of possible causes of the patient's problem or complaint
   b. ordering more labs
   c. the identification of the actual problem
   d. treatment with medicine or a procedure

EXERCISE 3 Identify the part of the SOAP note in which the following information would be found.

EXAMPLE: Ordering additional lab work to help arrive at the cause *P (Plan)*

1. Scheduling surgery _____
2. Past medical history, family history _____
3. A diagnosis _____
4. Patient's description of the problem or complaint _____
5. Treatment with medicine _____
6. An identification of the cause of the problem or complaint _____
7. Lab results _____
8. Determination of how long the patient has suffered from the same complaint _____
9. Information forms provided by the patient prior to the appointment _____
10. Initial imaging studies (for example, an x-ray) _____
11. Differential diagnosis _____
12. Ordering more tests or images _____
13. The patient's exam _____
14. List of possible causes that fit the description of the patient's problem _____

EXERCISE 4 Give an example of what would be found in each part of the SOAP note.

1. S—Subjective _____
2. O—Objective _____
3. A—Assessment _____
4. P—Plan _____

2.2 Types of Health Records

From an office setting to the hospital to the operating room, patients receive medical care in many different environments. Consequently, medical documentation of these visits demonstrates differences in their length and format. Regardless of these differences, medical notes continue to follow the same progression, starting from the subjective and ending with the plan. Even radiology and pathology reports exhibit this trend.

Medical records are routinely scoured to find specific information, such as:

- "What medicine did the cardiologist prescribe for the patient?"
- "When is the patient supposed to follow up?"
- "What did the patient have?"

In these instances, subheadings can serve as helpful guideposts. The following table features some common subheadings and their meanings.

The following are descriptions and examples of common types of health care records. As you will notice, they are not complete. The intention is to illustrate how charts are organized. Do not allow yourself to be distracted by any medical terms you have yet to learn. The notes are purposefully color-coded to help emphasize their segment in the SOAP format. The different sections of each note are color-coded in the following manner:

- Subjective: blue
- Objective: red
- Assessment: yellow
- Plan: green (*Note:* Sometimes assessment and plan run together; these instances appear in light green.)

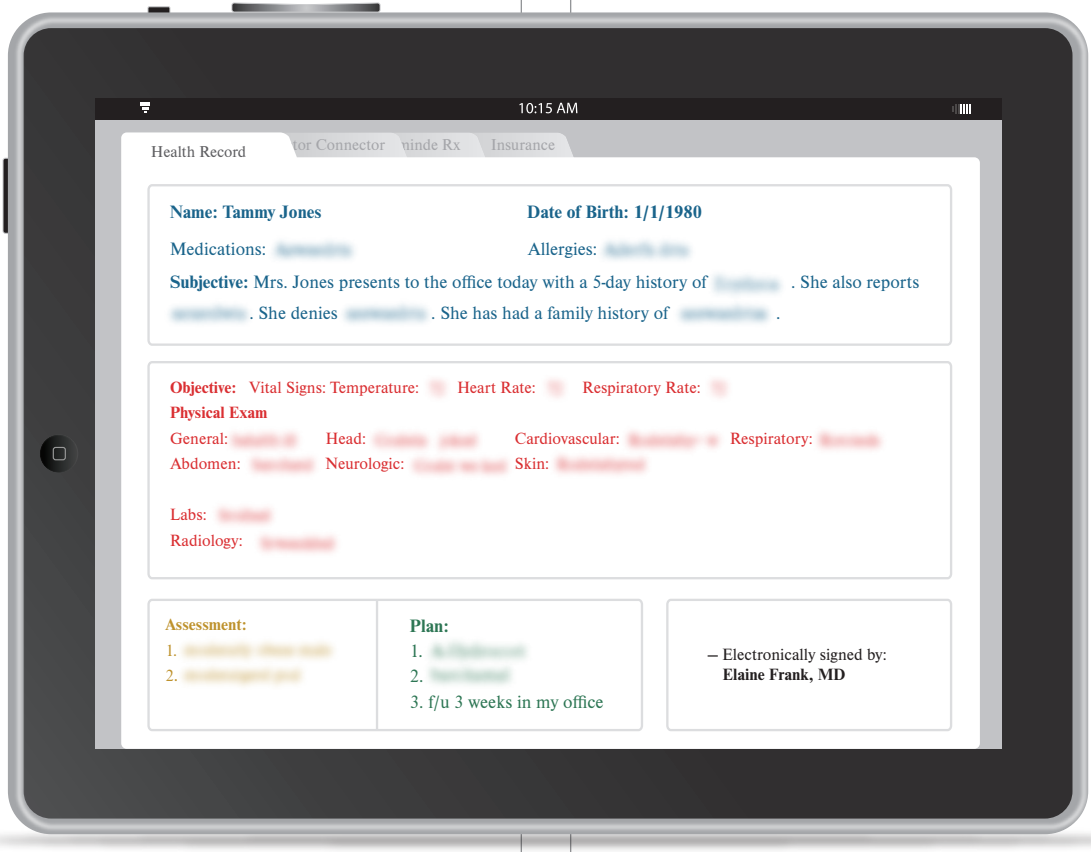
Health records play a vital role in helping organize and document a patient's medical history.
MarkLevant/Getty Images

sections of a health record	description
Chief complaint	The main reason for the patient's visit
History of present illness	The story of the patient's problem
Review of systems	Description of individual body systems in order to discover any symptoms not directly related to the main problem
Past medical history	Other significant past illnesses, such as high blood pressure, asthma, or diabetes
Past surgical history	Any of the patient's past surgeries
Family history	Any significant illnesses that run in the patient's family
Social history	A record of habits such as smoking, drinking, drug abuse, and sexual practices that can impact health

Example Note #1: Clinic Note

Anytime a health care professional sees a patient in an office setting, he or she must document the visit. These notes can be handwritten, dictated, or electronic, or they may involve simply circling the correct words or checking boxes on a template. Regardless of how they are done, these notes always follow the SOAP method. For new patients, there is generally more information in the chart. The SOAP notes for subsequent visits are often more streamlined.

The following is an example of a doctor's office SOAP note.



Example Note #2: Emergency Department Note

Patients seen in EDs and urgent care clinics are almost always new to the medical staff. Obtaining a good patient history from an ED patient is very important, as information about that patient's past is critical to getting a correct diagnosis in the present. One unique part of these notes is the ED course, which explains what happened to the patient during his or her stay in the ED. The ED course is a mixture of any completed diagnostic tests, the patient assessment, and a plan for the patient that unfolds over time.

CLINIC CORNER

Chief Complaint: Cough.
History of Present Illness: Mr. Stephen Dufresne is a 43-year-old male with a 3-day history of cough with [illegible].
Past Medical History: Asthma.
Past Surgical History: None.
Social History: Lives with his wife and two children. Nonsmoker. Drinks 4 glasses of wine a week.

Family History:
Father: Deceased at 68 years of age from stroke.
Mother: Alive, high blood pressure.
Medications: Albuterol, prn.
Allergies: No known drug allergies.

Physical Exam:
Vital Signs: Temperature: [illegible] Heart Rate: [illegible] Respiratory Rate: [illegible]
General: [illegible]
Head: [illegible]
Cardiovascular: [illegible]
Respiratory: [illegible]
Abdomen: [illegible]
Neurologic: [illegible]
Skin: [illegible]

Emergency Department Course:
Mr. Dufresne arrived to the emergency department in no apparent distress. A chest x-ray showed [illegible]. We treated him with oxygen and [illegible]. After two treatments of albuterol, he improved. He was diagnosed with and treated with [illegible].

Disposition:
Discharged to home, with follow-up in 3 days with his PCP.

–Christine Christenson, MD

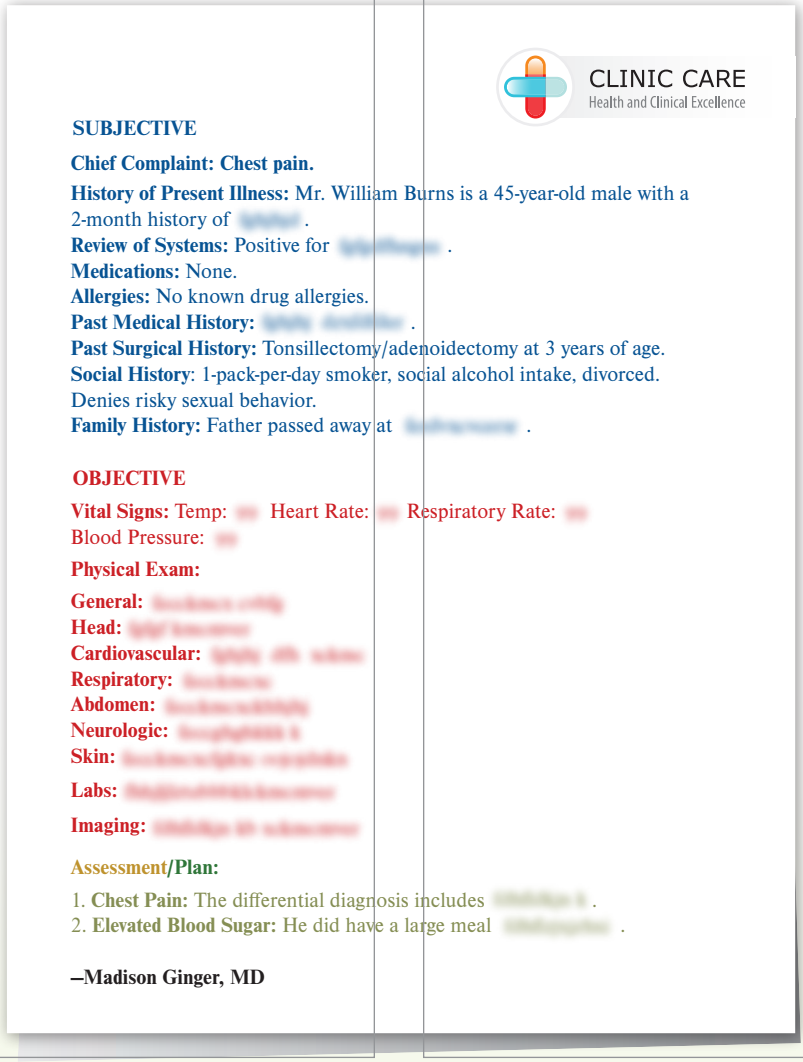
Example Note #3: Admission Summary

Upon admittance to the hospital, patients must provide a medical history and receive a physical exam. Afterward, the attending medical professional writes a detailed admission summary. Detailed admission summaries are usually thorough notes that are very heavy on the subjective and objective parts because the idea of the summary is to assemble all the facts in one place to help direct the entire hospital course.

- The assessment, which usually describes the thought process behind a patient's diagnosis and a list of possible causes for the patient's problem, is known as a *differential diagnosis.*
- The plan portion of the summary usually involves further testing, as well as care for the patient.

In a problem-based approach, the assessment and plan portions of the summary will be placed together. In such an approach, the patient's problems are numbered. After each number, the problems are described. The description is followed with a plan of what will be done about the problems.

Occasionally, a hospital team will send a courtesy letter to the patient's primary care provider (PCP). This letter can be similar to an admission note but is usually briefer.



CLINIC CARE
Health and Clinical Excellence

SUBJECTIVE

Chief Complaint: Chest pain.

History of Present Illness: Mr. William Burns is a 45-year-old male with a 2-month history of .
Review of Systems: Positive for .
Medications: None.
Allergies: No known drug allergies.
Past Medical History: .
Past Surgical History: Tonsillectomy/adenoidectomy at 3 years of age.
Social History: 1-pack-per-day smoker, social alcohol intake, divorced. Denies risky sexual behavior.
Family History: Father passed away at .

OBJECTIVE

Vital Signs: Temp: Heart Rate: Respiratory Rate:
Blood Pressure:

Physical Exam:

General:
Head:
Cardiovascular:
Respiratory:
Abdomen:
Neurologic:
Skin:

Labs:

Imaging:

Assessment/Plan:

1. **Chest Pain:** The differential diagnosis includes .
2. **Elevated Blood Sugar:** He did have a large meal .

—Madison Ginger, MD

summary of health record notes

	AUTHOR	LOCATION	PURPOSE	FORMAT AND ORDER	UNIQUE FEATURES
Clinic note	Medical professional	Clinic	Documents a visit	SOAP	New patient: Includes more history, separate form Repeat patient: Streamlined note
Consult note	Physician; usually a specialist	Clinic or hospital	Provides an expert opinion on a more challenging problem	SOAP	Can be in the form of a letter to the PCP
Emergency department note	ED medical staff	Emergency department	Documents an emergency department visit	SOAP	The A includes the ED course
Admission summary	Hospital medical professional	Hospital	Documents the admission of a patient to the hospital	SO A/P	S, O = Very thorough A = Differential diagnosis P = Further testing and care A + P = Problem-based approach
Discharge summary	Medical professional	Hospital	Describes when and why the patient was admitted; documents a longer stay	ASOP	Starts with A
Operative report	Surgeon		Documents a surgery in detail	ASOP	
Daily hospital note/progress note	Medical professional	Inpatient health care facility	Documents daily hospital visit	SO A/P	S—Focuses on how patient's condition has changed since the previous note A—Sometimes includes a differential diagnosis
Radiology report	Radiologist		Explains reason for image, how image was performed, what was seen on image, and radiologist's assessment; sometimes includes a recommendation	SOA	Usually includes only S, O, and A, but may include a P if it recommends that further studies should be performed
Pathology report	Pathologist		Provides reasons for test, what was seen on the test, and an assessment	SOA	
Prescription	Medical professional		Provides directions for a medication	P	1. Medicine's name 2. Instructions for patient 3. How much medicine should be given 4. Refills, if any 5. Health care professional's signature and whether generic substitution is allowed

2.3 Common Terms on Health Records

Your Future Second-Nature Words

Just as various sports have their own special words, such as *rebound, home run,* and *touchdown,* health records have special words that are essential to know. While the main purpose of this book is to help you use the roots of ancient words to break down medical words, you must also know many commonly used medical words that are not necessarily based on ancient languages.

When you have been working in the medical field long enough, these words will become second nature to you. You will use them so often that they will become part of your normal vocabulary. This chapter will introduce you to those terms so you will be better able to understand the stories told in health records.

Just like any other specialized field, medicine has a whole host of words that sound strange the first time but become second nature the more you use them.

(doctor) Fuse/Getty Images; (infant foot) Comstock Images/PictureQuest; (files) Antenna/Getty Images; (female doctor/patient) Terry Vine/Blend Images LLC

S

Subjective

As you recall, the subjective section of a health record tells the patient's personal story of his or her health issue. It includes things such as:

- the main reason for the health visit
- the description of his or her problem
- the timing of the problem
- previous medical problems or surgeries
- family health problems that might relate
- current medications and allergies

In describing the chief concern, you may include when the problem began, the severity, any associated problems, and whether anything seems to make the problem better or worse.

general subjective terms

TERM	DEFINITION
abrupt ah-BRUPT	all of a sudden
acute ah-KYOOT	it just started recently or is a sharp, severe symptom
afebrile AY-FEH-brail	to not have a fever

general subjective terms *continued*

TERM	DEFINITION
chronic KRAH-nik	it has been going on for a while now
exacerbation ek-SAS-er-BAY-shun	it is getting worse
febrile FEH-brail	to have a fever
genetic/hereditary jih-NEH-tik, hah-REH-dih-TEH-ree	runs in the family
lethargic lah-THAR-jik	a decrease in level of consciousness; in a medical record, this is generally an indication that the patient is really sick
malaise mah-LAYZ	not feeling well
noncontributory NON-kon-TRIH-byoo-TOR-ee	not related to this specific problem
progressive proh-GREH-siv	more and more each day
symptom SIM-tom	something a patient feels